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A

KEY

TO THE

PRACTICAL ARITHMETIC.

FOR THE USE OF TEACHERS

BY

JAMES B. THOMSON LL.D.

AUTHOR OF MENTAL EXERCISES; SLATE AND BLACK-BOARD EXERCISES;
ARITHMETICAL ANALYSIS; HIGHER ARITHMETIC;
EDITOR OF DAY'S SCHOOL ALGEBRA;
LEGENDRE'S GEOMETRY, ETC.

New Stereotype Edition, Revised and Enlarged.

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PREFACE.

The Key to the Revised edition of the Practical Arithmetic, has been prepared at the suggestion of many eminent teachers, for whose opinions the author cherishes a high regard.

But why should teachers want a Key, it is asked. It looks suspicious, says one. If they cannot solve the examples, they are not qualified for their station, adds another.

The character and scholarship of those who suggested the present work, are above suspicion. They desire it, not because they cannot solve the examples, but to *expedite the detection of errors;* they wish it, not because they shrink from toil, but to *save time*, which they may devote to illustrations and exercises upon the blackboard.

It is easy to see that the labor of discovering a mistake of a pupil by going through the whole of a long operation, might consume an *hour*, while a well-constructed Key would disclose it to the teacher in a *single minute*. This would save much time for general exercises.

The work here presented is designed to obviate these difficulties, and to aid teachers in their efforts to secure the best interests of their pupils. To this end references are made to the Article and page where the examples are found, so that they may be easily identified; the questions are analysed, and the operations necessary to their solution indicated by their proper signs; the results of the several steps, as well as the answers are given, their denominations carefully noted, &c.

By this plan it *is* believed the book will be found more convenient than if it were lumbered up with all the minor details in the operations of adding, subtracting, &c., and it is hoped teachers will find it, in all respects, adapted to their wants.

New York, *March 4th*, 1854.

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KEY.

SECTION I.

NUMERATION.—(p. 21.)

Art. 14.

Ex. 1. One hundred and twenty-seven.

2. One hundred and seventy-two.

3. Seven hundred and twenty-one.

4. Five hundred and twenty.

5. Six hundred and three.

6. Four thousand, five hundred and six.

7. Seven thousand, and forty-five.

8. Eight thousand, and seven hundred.

9. Twenty-five thousand, and eight.

10. Forty thousand, six hundred and twenty-five.

11. Seventy-five thousand, four hundred and seven.

12. One hundred and twenty-five thousand, two hundred and forty-two.

13. Two hundred and forty thousand, two hundred and fifty-one.

14. Four hundred and seven thousand, two hundred and three.

15. Three hundred thousand, and two hundred.

16. One million, two hundred and fifty-five thousand, six hundred and seventy-three.

17. Five millions, seven hundred and four thousand, and eighty-six.

18. Two hundred and seven thousand, and forty-seven.

19. Two millions, six hundred and five thousand, four hundred and one.

20. Four millions, forty thousand, six hundred and eighty.

21. Five millions, six hundred and four thousand, seven hundred.

22. Two millions, twenty thousand, one hundred and five.

23. Forty-five millions, one thousand, and three.

24. Thirty millions, four hundred and seven thousand, and forty-five.

25. One hundred and forty-five millions, five hundred and sixty thousand, and eight hundred.

26. Eight millions, nine hundred thousand, four hundred and one.

27. Two hundred and fifty millions, seven hundred and eight thousand, five hundred and ninety.

28. Eight hundred and three millions, sixty-eight thousand, and three.

29. Two billions, one hundred and seventy-five millions, two hundred and forty thousand, six hundred and seventy.

30. Seven billions, two hundred and forty millions, three hundred and five thousand, and sixty.

31. Forty-five billions, two hundred and ninety millions, one hundred thousand, and three hundred.

32. One hundred and sixty billions, and fifty thousand.

33. Seven billions, five millions, three thousand, and seven.

34. One hundred and one billions, two hundred and seventy-nine millions, two hundred thousand, three hundred and sixty-one.

35. One trillion, one hundred and forty-three billions, two hundred and six millions, six hundred and seventy-five.

36. Thirteen trillions, six hundred and fifty-seven billions, two hundred and forty millions, one hundred and twenty-nine thousand, six hundred and ninety-eight.

38. Ninety-eight trillions, six hundred and nine billions, six millions, six thousand, nine hundred and six.

39. Eighty trillions, seventy-nine billions, four hundred and one millions, six hundred and ninety-seven thousand.

39. One hundred and sixty-seven trillions, five hundred and forty billions, four hundred and sixty-five.

40. Five hundred and four trillions, sixty-nine billions, four hundred and seventy millions, three hundred thousand, and four hundred.

NOTATION.

Art. 15.

1. 27.
2. 72.
3. 125.
4. 352.
5. Given.
6. 1042.
7. 30,907.
8. 46,400.
9. 92,108.
10. 68,070.
11. 124,630.
12. 200,160.
13. 405,045.
14. 340,000.
15. 900,720.
16. 1,700,000.
17. 36,020,150.
18. 100,000,045.
19. 37,000,000.
20. 69,000,000.
21. 95,000,000.
22. 145,000,000.
23. 494,000,000.
24. 907,000,000.
25. 1,810,000,000.
26. 7,900,040,000.
27. 60,007,000,400.
28. 113,000,650,000.
29. 406,080,000,700.
30. 25,000,000,010,000.
31. 206,000,560,045.
32. 600,017,308.
33. 97,000,016,070,030.
34. 840,050,301,000.
35. 365,200,690,007,003,006

SECTION II.

ADDITION.—(p. 27.)

Art. 21.

1, 2. Given.

3. $786.
4. 8689.
5. 57757.
6. 651465.
7. 8651761.
8. 998943483.
9. 988.
10. 7673.
11. 88765.
12. 85879944.

Art. 29.

15. 1460.
16. 23770.
17. 161524.
18. 131570.
19. 1999990.
20. 1913.
21. 16840.
22. 220083.
23. 100003.
24. 134735.
25. 104022.

EXAMPLES FOR PRACTICE.—(p. 31.)

1. $64.
2. 966 lbs.
3. 96 years.
4. $976.
5. $109.
6. 106 shillings.
7. $550.
8. $3347.
9. $860.
10. $2378.
11. $2164.
12. 1893 scholars.
13. $1816.
14. 143 miles.
15. 582 acres.
16. $230
230
230
Ans. $690
17. 238 cents.
18. $1401.
19. $2788.
20. $264.
21. $846.
22. 375 + 379 = 754 sheep.
168 + 197 = 365 lambs.
Ans. 1119 both.
23. $6821.
24. $2324.
25. $4500 cost.
75 repairs.
150 enlar.
175 gain.
$4900 *Ans.*
26. $1444.
27. 503 trees
28. 476 miles.
29. 17
4
3
15
18
16
Ans. 73 years.
30. $184
268
379
467
350
Ans. $1648
31. $34950.
32. $10350 wife.
5450 son.
5450 "
5450 "
3500 daughter.
3500 "
$33700 Estate.
33. $3147.
34. $512.
35. 611 bushels.
$513
36. $627.
37. 630 pounds.
38. $3789.
39. $1125.
40. Cal. $568 cost.
$134 gain $134
Silks $479 cost.
$178 gain $178
Cloths $784 cost.
$242 gain $242
Rec'd $2385. gains $554

41. $1582.
42. $1323.
43. 525 miles.
44. $2649 oil.
$1367 candles.
$568 gain.
$346 gain.
$4930 received.

45. 2234822 N. E. States.
46. 4604345 Middle "
47. 5067843 South. "
48. 4984097 West. "
49. 178346 Ter. and Navy.

50. 2234822 N. E. States.
4604345 Middle "
5067843 South. "
4984097 West. "
178346 Ter. and Nav.
17069453 United States.

51. 4023
25201
2007
31231 *Ans.*

52. 60200
10006
410
26017
96633 *Ans.*

53. 601007
50200
400025
1001
1052233 *Ans*

54. 2002020
30080
405200
60060060
62497360 *Ans.*

55. 5010000045
8008008
2430200400
7448208453 *Ans.*

56. First find the cost of the farm, then add together the cost of each.
$2243 house.
$825 barn.
$3068 farm.
Ans. $6136 cost of all.

57. $2378
2378
2378
2378
2378
2378
2378
$16646 *Ans.*

58. $6275
6275
6275
18825
18825
$37650 *Ans.*

59. 1642
85
A.D. 1727 *Ans.*

60. $1500 A
1750 B
1975 C
3250 D
$8475 *Ans.*

61. Only a portion of the current year is past; therefore one less than the current year should be added to 4004.

62. 28
30
30
30
30
31
31
31
31
31
31
31 365 d. *Ans.*

63. 26
26
26
26
26
26
26
26
26
26
26
26 $312 *Ans.*

64. 1
2
3
4
5
6
7
8
9
10
11
12
78 in 12 hours.
78 " "
Ans. 156 strokes.

65. $2345
2345
2345
2345
2345
2345
2345
2245
2345
2345
2345
2345
2345
2345
2345
2345
2345
3345
2345
2345
2345
$49245 *Ans.*

66. 2727397 N. E.
5990270 Mid.
6689985 South.
7757065 West.
92255 Ter.
23256972 *Ans*

67. 850000000.
68. 103,131.
69. 120,524.
70. 93,649.
71. 1,062,086.
72. 1,012,939.
73. 1,065,910.
74. 9,716,789.
75. 3,596,013.
76. 36,481,665.

SUBTRACTION.—(p. 41.)

ART. 34.

1. Given.
2. Given.
3. $232.
4. 413.
5. $353
6. 418 feet.
7. 3332 lbs.
8. 3231 qts.
9. 32352.
10. 613134.
11. 531141.
12. 3151721.

ART. 36.—(p. 43.)

13. Given.
15. 248.
16. 54182.
17. 124907.
18. 66104149.

ART. 38.—(p. 44.)

20. 6121.
21. 2754087.
22. 932417.
23. 6834501.
24. 8960895.
25. 31090814.

EXAMPLES FOR PRACTICE.—(p. 45.)

1. 113 yards.
2. $221.
3. 189 gentlemen.
4. 1003 bushels.
5. $3791.
6. $1420.
7. $382.
8. $1079.
9. 374 bushels.
10. $1989.
11. $479.
12. From the current year subtract 1776.
13. $1291.
14. 53 miles.
15. 93 miles.
16. See Ex. 12.
17. 1790
    84
    A.D. 1706 *Ans.*
18. 67 years.
19. See Ex. 12.
20. $72320.
21. 427721.
22. 214412.
23. 1056109.
24. 194099.
25. 11763528.
26. Amt. of land is 389 A.
    Sold 126 acres.
    " 163 " 289
    Ans. 100 A.
27. Amt. of deposits, $1768
    Ck. $175
    " 238
    " 369 782
    Ans. $986
28. $87+$75+$16=$178
    $200−$178=$22. *Ans.*

29. $25+$27+$29=$81
$100—$81=$19 *Ans.*

30. 120+47+28=195
26+18+ 5= 49
Ans. 146 trees

31. Amt. of estate, $2700
Eldest $825
Second 785 1610
Youngest, $1090

32. Amt. of debts, $5648
Payt. $536
378
896 1810
Ans. $3838

33. Amt. of property, $7689
Railroad $689
Factory 500
Bank 1250 2439
Balance, $5250

34. $1763+$598=$2361
$2684—$2361=$323
Ans. $323.

35. 869+987=1856 acres,
3789—1856=1933 acres.
Ans. 1933 acres.

36. 29+37+19=85 men,
650—85=565 men *Ans.*

37. $2684+1786+987=
$5457
$5457—4684=$773 *Ans.*

38. $4673+5674+9287=
$19634
$37687—19634=$18053
Ans. $18053.

39. $86+$48+$148=$282
$282—$128=$154 *Ans.*

40 $6389+$6984=$13373
$18864—$13373=$5491
Ans. $5491.

41. $6749 *Ans.*

42. Gains, $867
" 687
" 563
" 435=$2552
Losses, $479
" 378= 857
Ans. $1695

43. Loans, $684
" 786
" 874
" 976
Amount, $3320
Payment, 568
Indebtedness, $2752 *Ans*

44. Income, $4586
Exp. $384
" 568
" 784
" 568
" 369= 2673
Balance, $1913

45. $8978+$374=$9352
$9684—$9352=$332

46. Wheat, 6384 bu.
Corn, 3752 "
Oats, 4564 "
Rye, 1384 "
Amt. 16084 bu.
Stolen, 3564 "
Ans. 12520 bu.

47. $5493
261
157=$5911
$3687
568
165= 4420
Ans. $1491

48. $3879 + $9857 = $13736
$1350 + $2687 = $ 4037
Ans. $9699

49. $5000 + $3578 = $8578
$30000 − $8578 = $21422

50. $25000 wife received.
$32000 1st son "
$32000 2d " "
$32000 3d " "
$23000 1st daught. rec'd.
$23000 2d " "
$167000 family rec'd.
$175000 − 167000 = $8000

51. 22225 *Ans.*

52. 16016016
1600
16014416 *Ans.*

53. 185000000000
185000000
184815000000 *Ans.*

54. 2815
563, 1st.
2252
563, 2d.
1689
563, 3d.
1126
563, 4th.
563
563, 5th.
Ans. 5 times.

55. From 630712
Take 3645
Ans. 627067

56. 1776
1732
Ans. 44 years.

57. 77 years.

58. 4965
681, 1st.
4284
681, 2d.
3603
681, 3d.
2922
681, 4th.
2241
681, 5th.
1560
681, 6th.
879
681, 7th.
Ans. 198 rem.

59. From the current year subtract 1620.

60. ———

61. 1400
175, 1st.
1225
175, 2d
1050
175, 3d.
875
175, 4th.
700
175, 5th.
525
175, 6th.
350
175, 7th.
175
175, 8th.
Ans. 8 years.

62. From 2323
Take 836
1487 *Ans.*

63. 3576
1131
2445 *Ans.*

64.. 2791
1643
1148 *Ans.*

65. 4827
2491
2336 *Ans.*

66. 265 165
423 361
236 526
924 −97
−117 429
807
−429
378 *Ans.*

67. 576,−208; 403,−256
1645,−321; 814,−195
2221,−529; 1217,−451
−529 −451
1692 766
−766
926 *Ans.*

68. 6031 greater.
1237 dif.
4794 *Ans.*

69. 3107 greater.
1920 dif.
1187 *Ans.*

70. 37249
20703
16546 *Ans.*

71. 7209407−999999=
6209408 *Ans.*

72. 19289
−176
19113
+42371
61484 *Ans.*

73. 26017
−17312
8705
+18268
26973 *Ans.*

74. 9897
−3076
6821
+27239
34060 *Ans.*

75. $ 8265, 1st.
15687, 2d.
23952, 3d.
$47904 Amt.
$75000 prop.
−47904 given.
$27096 *Ans.*

76. 2675 A's sheep.
−763
B has 1912 sheep.
4587 A's & B's.
−105
C has 4482 sheep.

77. 9277, 1st.
−1283
7994, 2d.
17271, 1st & 2d.
23257, Whole No.
−17271, 1st & 2d.
Ans. 5986, 3d.

MULTIPLICATION.—(p. 56.)

ART. 49.

1, 2. Given.
3. 936.
4. 484.
5. 960 rods.
6. 880 miles.
7. 9096.
8. 88,480.
9. 505,505.
10. 18,073,812.
11. $4698.
12. $664.
13. 1917 shillings.
14. $624.
15. $6153.
16. 5200 shillings.
17. 40030.
18. 608,240.
19. 76342.
20. 41,479,110.

ART. 54. (p. 58.)

21–23. Given.
24. 3915.
25. 19,200.
26. 23,074.
27. 88,832.
28. 175,252.
29. 268,435,125.
30. 507,166,416.

31.
$$\begin{array}{r} 930005 \\ 6004 \\ \hline 3720020 \\ 5580030 \\ \hline 5583750020 \end{array} \textit{ Ans.}$$

32.
$$\begin{array}{r} 803044 \\ 7008 \\ \hline 6424352 \\ 5621308 \\ \hline 5627732352 \end{array} \textit{ Ans.}$$

33.
$$\begin{array}{r} 9845678 \\ 80006 \\ \hline 59074068 \\ 78765424 \\ \hline 787713314068 \end{array} \textit{ Ans.}$$

EXAMPLES FOR PRACTICE.—(p. 61.)

1. $2790.
2. $2552.
3. $36720.
4. 4056 shillings.
5. 5301 shillings.
6. $37152.
7. $42255.
8. 11370 shillings.
9. $410400.
10. $420.
11. $414.
12. $945.
13. $1792.
14. $1664.
15. $2522.
16. $2090.
17. 4935 shillings.
18. 3071 bushels.
19. 2944 quarts.
20. $22224.
21. $1482.
22. $8691.

23. $10584.
24. $4096.
25. 35720 days.
26. 16425 days.
27. 90625 lbs.

28. 725 lbs.
243
176175 lbs. *Ans.*

29. 78475 miles.
30. $77970.

31. 4623
2185
23115
36984
4623
9246
10101255 *Ans.*

32. 50301
3076
301806
352107
150903
154725876 *Ans.*

33. 68023
4231
68023
204069
136046
272092
287805313 *Ans.*

34. 84209
72032
168418
252627
168418
589463
6065742688 *Ans.*

35. 940325
52363
2820975
5641950
2820975
1880650
4701625
49238237975 *Ans.*

36. 452305
6321
452305
904610
1356915
2713830
2859019905 *Ans.*

37. 503042
80423
1509126
1006084
2012168
4024336
40456146766 *Ans*

38. 843891
98756
5063346
4219455
5907237
6751128
7595019
83339299596 *Ans.*

39. 7003402
603001
7003402
21010206
42020412
4223058409402 *Ans*

40. 8823403762605 25.

41. 2007
1004
8028
2007
2015028 *Ans.*

42. 4040
2103
12120
4040
8080
8496120 *Ans.*

43. 40404
10010
404040
40404
404444040 *Ans.*

44. 105007
60403
315021
420028
630042
6342737821 *Ans.*

45. 5000206
70205
25001030
10000412
35001442
351039462230 *Ans.*

46. 560 × 13 s.=7280 s.
68 s.
Cost, 7348 s.
Rec'd. 560×17 s.=9520 s.
Ans. 2172 s.

47. 360×\$19=\$6840 cattle.
96×\$23= 2208 horse.
Gained \$4632 *Ans.*

48. 185×36 s.= 6660 s.
117×41 s.= 4797 s.
Cost, 11457 s.
185 bbls.
117 "
302×39 s.=11778 s. rc'd.
11778 s.—11457 s.=321 s
Ans. 321 s. gain

49. 259 semibreves.
2
518 minims.
2
1036 crotchets.
2
2072 quavers.
2
4144 semi-qua.
2
8288 demi-semi qua.

50. 1024 miles.

CONTRACTIONS IN MULTIPLICATION.—(p. 63.)

ART. 55.

1. 4=2×2
6=3×2
9=3×3
10=5×2.

2. 15= 5×3
21= 7×3
22=11×2
25= 5×5.

3. 33=11×3
35= 7×5
14= 7×2
77=11×7
49= 7×7
55=11×5.

4. 8= 4×2; 2×2×2.
12= 4×3; 6×2; 3×2×2.
16= 8×2; 4×4; 4×2×2; 2×2×2×2.
18= 9×2; 6×3; 3×3×2.
20=10×2; 5×4; 5×2×2.
5. 30= 6×5; 10×3; 15×2; 5×3×2.
32= 8×4; 16×2; 8×2×2; 4×4×2; 4×2×2×2; 2×2×2×2×2.
36=12×3; 9×4; 6×6; 18×2; 9×2×2; 6×3×2; 4×3×3; 3×3×2×2.
40=10×4; 8×5; 20×2; 10×2×2; 5×4×2; 5×2×2×2.
6. 50=10×5; 25×2; 5×5×2.
54= 9×6; 18×3; 27×2; 9×3×2; 6×3×3; 9×3×2; 3×3×3×2.
56= 8×7; 14×4; 28×2; 7×4×2; 14×2×2; 7×2×2×2.
60=12×5; 10×6; 15×4; 20×3; 10×3×2; 5×4×3; 5×3×2×2.
63= 9×7; 21×3; 7×3×3.
64= 8×8; 16×4; 32×2; 16×2×2; 4×4×4; 8×4×2; 4×4×2×2; 8×2×2×2; 4×2×2×2×2; 2×2×2×2×2×2.
72=12×6; 9×8; 18×4; 36×2; 24×3; 6×4×3; 8×3×3; 9×4×2; 12×3×2; 6×3×2×2; 3×3×2×2×2; 4×3×3×2.
81= 9×9; 27×3; 9×3×3; 3×3×3×3.
84=12×7; 14×6; 28×3; 21×4; 42×2; 7×4×7×6×2; 21×2×2; 7×3×2×2.
96= 12×8; 3×2×2×2×2×2; &c.

Art. 57. (p. 64.)

2. $2295.
3. $888.
4. $684.
5. $4950.
6. 1872 shillings.
7. 8610 miles.
8. 25760 bushels.
9. 16128 shillings.
10. $91080.

Art. 59. (p. 65.)

11. 280 lbs.
12. 35200 pages.
13. 476,000.
14. 534,860,000.
15. 1,209 670,800,000.

16. 26,900,785,000,000.
17. 890,634,570,000,000.
18. 946,030,506,800,000.
19. 783,120,650,730,000.

ART. **61.** (p. 66.)

20—22. Given.
23. 3,840,000.
24. 10,940,000.
25. 2,075,994,000.
26. 390,677,500,000.
27. 372,000.
28. 11,840,000.
29. 373,520,000.
30. 3,603,200,000.
31. 55,447,000,000.
32. 37,800,000,000.
33. 25,800,000,000.
34. 4,059,360,000.
35. 14,760,000,000.
36. 6,604,000,000.
37. 1,672,650,000,000.
38. 1,075,635,900,000.

ART. **62.** (p. 67.)

39, 40. Given.
41. 7,767,837.
42. 34,572,393.
43. 677,789,532.
44. 733,832,433.
45. 839,832,327.
46. 78,937,735,437.
47. 874,319,056,722
48. 960,311,096,793.
49. 8,759,995,239,996.
50. 9,999,989,000,001.

SHORT DIVISION.—(p. 73.)

ART. **69.**

1, 2. Given.
3. 7.
4. 6.
5. 6.
6. 9.
7. Given.
8. 123 sheep.
9. 124 acres.
10. 122 times.
11. Given.
12. 321 yards.
13. 21312.
14. 12212.
15 11111.
16. 1243148.
17—19. Given.

ART. **72.**

20. 51.
21. 312.
22. 8231.
23. 711.
24. 7111.
25. 811.
26. 8111.
27. 911.
28. 247 acres.
29. Given.
30. 48 pounds.
31. 7615.
32. 6573.
33. 16334.
34. 3144.
35. 107 barrels.

36. 6010.
37. 7000.
38. 5100.
39. 71000.
41. $107.
42. 2050.
43. 5070.
44. 5021.
45. 80405.
46. $137\frac{1}{4}$ oranges.
47. 62 pair.

48. $151\frac{1}{5}$ barrels.
49. 52 yearlings.
50. $162\frac{1}{6}$ acres.
51. $781150\frac{3}{7}$.
52. 584038.
53. $666666\frac{6}{9}$.
54. $1167173\frac{3}{6}$.
55. $703401\frac{6}{10}$.
56. $736145\frac{8}{11}$.
57. $692227\frac{10}{12}$.
58. $800283\frac{9}{12}$.

LONG DIVISION.—(p. 77.)

ART. 74.

1—4. Given.
5. $127208\frac{3}{6}$.
6. 1342314.
7. 326561.
8 336568.
9. 6437612.
10. 72225723.

ART. 77. (p. 78.)

11—13. Given.
14. 245.
15. $1326\frac{20}{45}$.
16. $1212\frac{25}{67}$.
17. $1227\frac{48}{81}$.
19. $1080\frac{29}{93}$.
20. $901\frac{116}{156}$.

EXAMPLES FOR PRACTICE.—(p. 79.)

1. 24 hours.
2. 36 yards.
3. 43 cattle.
4. 108 tons.
5. 13 months.
6. 20 days.
7. $10\frac{5}{21}$ miles.
8. 11 tons.
9. 11 casks.
10. 120 miles.
11. 200 miles.
12. 250 miles.
13. $13\frac{4}{31}$ months.

14. 20 hhds.
15. 11 miles.
16. 14, and 4 r.
17. 42.
18. 39, and 7 r.
19. 72, and 12 r.
20. 588, and 8 r.
21. 24, and 61 r.
22. 8, and 13 r.
23. 227, and 10 r.
24. 269, and 3 r.
25. 2813, and 27 r
26. 34, and 34 r.

27. 173, and 25 r.
28. 158, and 40 r.
29. 388, and 55 r.
30. 63, and 72 r.
31. $116\frac{66}{419}$.
32. $82\frac{646}{728}$.
33. $682\frac{501}{863}$.
34. $808\frac{447}{978}$.
35. $206\frac{1349}{2145}$.
36. $81\frac{2060}{2486}$.
37. $745\frac{3954}{4703}$.
38. $1178\frac{2374}{6841}$.
39. $119\frac{37247}{38026}$.
40. $229\frac{37229}{41722}$.
41. $264\frac{47222}{53072}$.
42. $289\frac{57827}{70321}$.
43. $93\frac{16338}{800034}$.
44. $80\frac{566005}{900023}$.
45. $666\frac{257867}{600724}$.
46. $840\frac{111502}{321672}$.
47. $44\frac{970339}{4023412}$.
48. $35\frac{39259941}{56021348}$.
49. $100\frac{11993206}{623187912}$.
50. $215\frac{1303135408}{4123418978}$.

CONTRACTIONS IN DIVISION.—(p. 81.)

ART. 78.

1, 2. Given.
3. 6 pears.
4. Given.
5. 7, and 5 r.
6. 3, and 21 r.

ART. 80. (p. 83.)

7. Given.
8. 10; 25; 38; 2500 d.
9. 65; 765; 4320; 150000.
10. Given.
11. 44, and 360791 r.
58, and 6670517 r.
12. 8236, and 7180309 r.;
9634, and 56789121 r.

ART. 81. (p. 84.)

13, 14. Given.
15. 34 bbls.
16. 210 regiments
17. $68\frac{1}{2}\frac{19}{100}$.
18. $179\frac{18679}{24000}$.
19. 98, and 19 r.
20. 167, and 7 r.
21. 159, and 41 r.
22. 1292, and 27 r.
23. 2120, and 99 r.
24. 5057, and 17 r.

EXERCISES IN THE FUNDAMENTAL RULES.—(p. 85.)

1. 1563+2570=4133; 4133−3278=855;
855×387=330885; 330885÷273=1212 and 9 rem.
2. 3456÷216=16; 16×279=4464; 4464−308=4156;
4156+28256=32412 amount. *Ans.*
3. 256×576=147456; 147456÷192=768;
768+25071=25839; 25839−18203=7636 rem.

4. 9408−8256=1152; 1152÷96=12;
12+246045=246057;
246057−73418=172639;
172639×3056=527584784 prod. *Ans.*

5. 93m.×17=1581 miles one traveled;
115m.×17=1955 miles the other traveled;
then 1955−1581=374 miles distance apart. *Ans.*

6. 68×34=2312 number pieces; 2312×29=67048 yds.

7. 155×$34=$5270; $65×19=$1235; 15×17=$255;
$1235+$255=$1490;
then $5270−$1490=$3780 *Ans.*

8. 11371÷137=83 *Ans.*

9. 275×383=105325; 105325+49=105374 the div.

10. 2756−180=2576; 2576÷184=14 divisor. *Ans.*

11. 6521088÷5376=1213 multiplier. *Ans.*

12. 18791÷437=43 subtractions. *Ans.*

13. 365×$7=$2555; $3176−$2555=$621 *Ans.*

14. $2170×365=$792050, and $792050÷$1085=730.
Ans. 730 schools.

15. 467×$16=$7472; $9340÷467=$20 per acre;
$9340−$7472=$1868 gain. *Ans.*

16.
67 yards at 42 s.=2814 s.
89 yards " 14 s.=1246 s.
29 doz. " 63 s.=1827 s.
58 doz. " 48 s.=2784 s.
Amount of bill, 8671 s. *Ans.*

17. 563×$65=$36595, and $36595+$860=$37455;
then $37455÷563=$66$\frac{297}{563}$ *Ans.*

18. 650×7 s.=4550 s.; and 650−56=594;
then 4550÷594=7$\frac{392}{594}$ shillings. *Ans.*

19.
863×$38=$32794 price of cows.
356×$75=$26700 " " horses.
Cows cost $6094 most. *Ans.*

20. 1368÷6=228 a. B's land; 228÷2=114 a. C's land
then 1368+228+114=1710 acres, all own.

21. $3750+$8050=$11800 whole cost;
$3750÷75=$50, the price per head for one lot;
$8050÷115=$70, price per head for other lot;
$11800÷190=$62$\frac{20}{190}$, selling price.

22. 252÷14=18 smaller No. 18×49=882 larger No.

23. 25000÷76=$328\frac{72}{76}$ lbs. cotton;
25000÷95=$263\frac{15}{95}$ lbs. wool.

24. 2496000÷1600=1560 men.

25. 68275−45263=23012, and 103+28+268=399.
Now 23012×399=9181788 prod. *Ans.*

26. 14350+7845=22195, and 22195÷965=23;
then 23×386=8878, and 8878−761=8117 rem. *Ans.*

27. 250+173=423; 250−173=77; 423×77=32571;
and 32571÷45=$723\frac{36}{45}$ quot. *Ans.*

28. 368×134=49312 men.

29. 49312÷16=3082 men.

30. By the question, $4756 A's share.
$4756+$763= 5519 B's "
$5519−$256= 5263 C's "
$15538 A, B, and C's.
Then $16256−$15538=$718 D's share. *Ans.*

31. 538×23 s.= 12374 s. paid
321×18 s.= 5778 s. "
859 No. bought. 18152 s. Amt. paid.
276×27 s.= 7452 s. received.
186×31 s.= 5766 s. "
462 No. sold. 13218 s. Amt. rec'd.
859−462=397 No. left,
18152 s.−13218 s.=4934 s., cost of those left.
Now 4934 s.÷397=$12\frac{170}{397}$ s. *Ans.*

32. 84×$51=$4284, and $18130−$4284=$13846.
Then 13846÷43=322; 322+84=406 oxen. *Ans.*

33. 46481×936= 43506216
9313702853÷1987= 4687319
Ans. 38818897

34. 361×$48=$17328; 83×$67=$5561; and 96×$56
=$5376.
Now $5561+$5376=$10937; and $17328−$10937
=$6391, cost of those left,
96+83=179; then 361−179=182 No. left;
and $6391÷182=$$35\frac{21}{182}$, price per head

35. 56×11 m.=616 m.; 16×14m.=224m.
Now 616 m.—224 m.=392 miles. *Ans.*

36. 85 m.×13=1105 m.; 138 m.×8=1104 m.
Then 1105—1104=1 mile. *Ans.*

37. By the question, $1265 A's prop. $1265 A's
$1265×4+$183= 5243 B's " 5243 B's
$6508×3—2348= 17176 C's
All are worth $23684 *Ans.*

ANALYSIS OF COMPOSITE NUMBERS.—(p. 92.)

ART. 89. *a.*

1. Given.
2. 24=2×2×2×3.
26=2×13.
32=2×2×2×2×2.
34=2×17.
36=2×2×3×3.
39=3×13.
44=2×2×11.

3. 46=2×23.
48=2×2×2×2×3.
51=3×17.
52=2×2×13.
58=2×29.
62=2×31.
68=2×2×17.
69=3×23.

4. 70=2×5×7.
72=2×2×2×3×3.
74=2×37.
75=3×5×5.
76=2×2×19.
78=2×3×13.
82=2×41.
85=5×17.

5. 120=2×2×2×3×5.
124=2×2×31.
136=2×2×2×17.
156=2×2×3×13.
208=2×2×2×2×13.
145=5×29.
225=3×3×5×5.

6. 256=2×2×2×2×2×2×2×2.
344=2×2×2×43.
576=2×2×2×2×2×2×3×3.
672=2×2×2×2×2×3×7.
796=2×2×199.
864=2×2×2×2×2×3×3×3.
945=3×3×3×5×7.

7. 3420=2×2×3×3×5×19.
18500=2×2×5×5×5×37.
46096=2×2×2×2×43×67.
96464=2×2×2×2×6029.

CANCELLATION.—(p. 93.)

ART. 91.

1. Given.

2. $\cancel{8}\cancel{5})\overline{\cancel{8}\cancel{5}\times 31}$

$\quad 31$ *Ans.*

3. $\cancel{5}\cancel{8})76\times\cancel{5}\cancel{8}$

$\quad 76$ *Ans.*

4. $\cancel{4}\cancel{0})75\times\cancel{4}\cancel{0}$

$\quad 75$ *Ans.*

5, 6. Given.

7. $\cancel{7})95\times\cancel{3}\cancel{5},\ 5$

$\quad 95\times5=475$ *Ans.*

8 $\cancel{8})133\times\cancel{4}\cancel{8},\ 6$

$\quad 133\times6=798$ *Ans.*

9. $\cancel{1}\cancel{2})156\times\cancel{9}\cancel{6},\ 8$

$\quad 156\times8=1248$ *Ans.*

10, 11. Given.

Note.—The process of canceling the equal factors in the divisor and dividend may, perhaps, be more readily seen by arranging the factors which compose the divisor on the left of a perpendicular line, and those which compose the dividend on the right. Thus,

12.
$$\begin{array}{r|l} \cancel{5} & \cancel{7} \\ \cancel{7} & 9 \\ \cancel{8} & \cancel{1}\cancel{5},\ 3 \\ & \cancel{8} \\ \hline \textit{Ans.} & 9\times3=27. \end{array}$$

13.
$$\begin{array}{r|l} \cancel{1}\cancel{2} & \cancel{6} \\ \cancel{6} & \cancel{3} \\ & 7 \\ & \cancel{4} \\ \hline \textit{Ans.} & 7. \end{array}$$

14.
$$\begin{array}{r|l} & \cancel{2} \\ \cancel{3}\cancel{0} & 28 \\ & \cancel{1}\cancel{5} \\ \hline \textit{Ans.} & 28. \end{array}$$

15.
$$\begin{array}{r|l} & 5 \\ \cancel{7} & 6 \\ \cancel{8} & \cancel{5}\cancel{6} \\ \hline \textit{Ans.} & 6\times5=30. \end{array}$$

GREATEST COMMON DIVISOR.—(p. 95.)

ART. 95. (p. 96.)

1. Given.
2. 3.
3. 4.
4. 5.
5. 4.
6. 3.

ART. 96. (p. 96.)

8. 21.
9. 13.
10. 19.
11. 15.
12. The greatest common divisor of

2145 and 3471, is 39;
464320 and 18945, is 5;
638296 and 33888, is 8;
18996 and 29932, is 4;
260424 and 54423 is 9;
143168 & 2064888, is 8.

ART. 97. (p. 96.)

13. Find the greatest common divisor of 63 and 105, viz.: 21; then of 21 and 140, which is 7. *Ans.*
14. Find the greatest common divisor of 16 and 24, viz.: 8; then of 8 and 100, which is 4. *Ans.*
15. Find the greatest common divisor of 492 and 744, viz.: 12; then of 12 and 1044, which is 12. *Ans.*

LEAST COMMON MULTIPLE.—(p. 97.)

ART. 102.

15, 16. Given.
17. 36.
18. 48.
19. 90.
20. 90.
21. 240.
22. 12600.
23. 504.
24. 1134.
25. 144.
26. 2)2″3″4″5″6″7″8″9

2)1 3 2 5 3 7 4 9

3)3 1 5 3 7 2 9

1 1 5 1 7 2 3

$2\times2\times3\times5\times7\times2\times3$ $=2520$ *Ans.*

27 17, 29, and 53 are prime numbers, hence (ART. 102 Obs. 3.)

$17\times29\times53=26129.$

Ans. 26129.

28. 8, 9, 55 and 49 are prime to each other; hence

$8\times9\times55\times49=194040$

Ans. 194040.

29. 156240.
30. 144.

Note.—The least common multiple of the given number of hours in which each can perform the circuit, will be the time when all will meet at the starting place.

31. 2)8″10″12

2)4 5 6

2 5 3

$2\times2\times2\times5\times3=120$ h.

Ans. 120 hours.

32. 2)8″10″12″6″16″18

2)4 5 6 3 8 9

2)2 5 3 3 4 9

3) 5 3 3 2 9

5 1 1 2 3

$2\times2\times2\times3\times5\times2\times3$ $=720$ hours. *Ans.*

REDUCTION OF FRACTIONS.—(p. 108.)

Art. 120.

1, 2. Given.
3. $\frac{1}{2}$.
4. $\frac{2}{3}$.
5. $\frac{8}{9}$.
6. $\frac{2}{3}$.
7. $\frac{2}{3}$.
8. $\frac{25}{29}$.
9. $\frac{3}{5}$.
10. $\frac{6}{11}$.
11. $\frac{10}{13}$.
12. $\frac{7}{9}$.
13. First find the greatest common divisor of the numerator and denominator, which is 17; then divide them both by it. *Ans.* $\frac{16}{25}$.
14. The greatest common divisor is 87. *Ans.* $\frac{5}{11}$.
15. The greatest common divisor is 384. *Ans.* $\frac{1}{3}$.
16. The greatest common divisor is 580. *Ans.* $\frac{3}{5}$.
17. The greatest common divisor is 18. *Ans.* $\frac{33}{119}$.
18. The greatest common divisor is 15. *Ans.* $\frac{431}{489}$.

Art. 121. (p. 109.)

19, 20. Given.
21. 4.
22. 5.
23. $2\frac{5}{8}$.
24. $7\frac{1}{2}$.
25. 1.
26. $41\frac{2}{3}$.
27. 30.
28. $28\frac{93}{248}$.
29. $28\frac{1}{6}$.
30. $22\frac{293}{320}$.

Art. 122. (p. 110.)

31, 32. Given.
33. $\frac{29}{3}$.
34. $\frac{133}{8}$.
35. $\frac{214}{9}$.
36. $\frac{545}{12}$.
37. $\frac{968}{15}$.
38. $\frac{2543}{45}$.
39. $\frac{913}{3}$.
40. $\frac{3626}{5}$.
41. $\frac{225}{5}$.
42. $\frac{576}{8}$.
43. $\frac{4980}{6}$.
44. $\frac{11145}{15}$.

Art. 123. (p. 111.)

45, 46. Given.
47. $\frac{5}{144}$.
48. $\frac{8}{315}$.
49. $\frac{77}{520}$.

Art. 124.

50, 51. Given.
52. $\frac{\cancel{2}}{7}$ of $\frac{\cancel{6}}{9}$ of $\frac{10}{\cancel{12}}=\frac{10}{63}$. *Ans*
53. Canceling the factors 4 and 7, which are common both to the numerators and denominators, we have $\frac{5}{72}$ Ans.

54. The factors 5, 2, and 4 in the numerators, are equal to 5 and 8 in the denominators. Canceling them, we have $\frac{7}{90}$. *Ans.*

Note.—It is sometimes convenient to arrange the terms of the fractions on each side of a perpendicular line, placing the numerators, which answer to dividends, on the right, and the denominators, which answer to divisors, on the left of the line. (Art. 109.)

55. *Operation.*

$$\begin{array}{r|l} \cancel{10} & \cancel{8} \\ 5,\ \cancel{15} & \cancel{12},\ \cancel{4} \\ \cancel{32} & \cancel{20},\ 2 \\ \hline 5 & 2=\frac{2}{5}.\ \textit{Ans.} \end{array}$$

56.

$$\begin{array}{r|l} 10 & \cancel{6} \\ \cancel{3},\ \cancel{18} & \cancel{15},\ \cancel{5} \\ \cancel{9} & 7 \\ 4,\ \cancel{20} & \cancel{9} \\ \hline 40 & 7=\frac{7}{40}.\ \textit{Ans.} \end{array}$$

57.

$$\begin{array}{r|l} \cancel{9} & \cancel{2} \\ 12 & \cancel{17} \\ \cancel{17} & \cancel{13} \\ \cancel{26} & \cancel{9} \\ \hline 12 & 1=\frac{1}{12}.\ \textit{Ans} \end{array}$$

58.

$$\begin{array}{r|l} \cancel{12} & \cancel{3} \\ 17 & \cancel{6} \\ 7 & 9 \\ \cancel{3} & \cancel{2} \\ \hline 119 & 9=\frac{9}{119}.\ \textit{Ans} \end{array}$$

59 $$\frac{\cancel{5}}{\cancel{7}} \text{ of } \frac{\overset{2}{\cancel{14}}}{25} \text{ of } \frac{31}{\cancel{5}} \text{ of } \frac{17}{1} = \frac{1054}{25}.\ \textit{Ans.}$$

60. $$\frac{\cancel{17}}{\underset{7}{\cancel{35}}} \text{ of } \frac{27}{\underset{4}{\cancel{68}}} \text{ of } \frac{239}{8} \text{ of } \frac{\overset{15}{\cancel{75}}}{1} = \frac{96795}{224}.\ \textit{Ans.}$$

61. $$\frac{\cancel{13}}{\cancel{16}} \text{ of } \frac{\cancel{12}}{\underset{2}{\cancel{26}}} \text{ of } \frac{\overset{7}{\cancel{21}}}{\underset{\cancel{15},\,5}{\cancel{45}}} \text{ of } \frac{\cancel{16}}{\underset{2}{\cancel{24}}} \text{ of } \frac{\overset{113}{\cancel{339}}}{4} = \frac{791}{80}.\ \textit{Ans.}$$

62. $$\frac{\cancel{7}}{\cancel{9}} \text{ of } \frac{\cancel{13}}{\cancel{14}} \text{ of } \frac{\cancel{9}}{\underset{2}{\cancel{26}}} \text{ of } \frac{\cancel{2}}{7} \text{ of } \frac{941}{11} = \frac{941}{154}.\ \textit{Ans.}$$

63. $$\frac{\cancel{42}}{\cancel{54}} \text{ of } \frac{\cancel{18}}{\cancel{14}} \text{ of } \frac{\cancel{3}}{5} \text{ of } \frac{536}{\cancel{3}} = \frac{536}{5}.\ \textit{Ans.}$$

64. $$\frac{\cancel{17}}{\cancel{19}} \text{ of } \frac{\cancel{38}}{\cancel{34}} \text{ of } \frac{\overset{25}{\cancel{75}}}{87} \text{ of } \frac{\cancel{2}}{\cancel{3}} \text{ of } \frac{1}{\cancel{2}} = \frac{25}{87}.\ \textit{Ans.}$$

65. $$\frac{\overset{5}{\cancel{35}}}{103} \text{ of } \frac{3}{\cancel{7}} \text{ of } \frac{21}{\cancel{37}} \text{ of } \frac{3}{8} \text{ of } \frac{\cancel{37}}{1} = \frac{945}{824}.\ \textit{Ans.}$$

ART. 125. (p. 113)

1—3. Given.

4. $\frac{1}{9}=\frac{12}{108}$; $\frac{2}{3}=\frac{72}{108}$; $\frac{3}{4}=\frac{81}{108}$.

5. $\frac{2}{6}=\frac{60}{180}$; $\frac{1}{2}=\frac{90}{180}$; $\frac{4}{5}=\frac{144}{180}$; $\frac{2}{3}=\frac{120}{180}$.

6. $\frac{945}{2520}$; $\frac{1440}{2520}$; $\frac{1680}{2520}$; $\frac{1008}{2520}$.

7. $\frac{5880}{6720}$; $\frac{4800}{6720}$; $\frac{4032}{6720}$; $\frac{3920}{6720}$.

8. $\frac{4725}{5250}$; $\frac{4500}{5250}$; $\frac{4200}{5250}$; $\frac{2100}{5250}$.

9. $\frac{33600}{70000}$; $\frac{63000}{70000}$; $\frac{47250}{70000}$

10. $\frac{20000}{50000}$; $\frac{35000}{50000}$; $\frac{10400}{50000}$.

11. $\frac{49}{147}$; $\frac{1281}{147}$; $\frac{588}{147}$.

12. $\frac{168}{3920}$; $\frac{5950}{3920}$.

LEAST COMMON DENOMINATOR.

ART. 126. (p. 114.)

13—15, Given.

16. The least common denominator of $\frac{3}{4}$, $\frac{5}{6}$, and $\frac{7}{9}$, is 36.
$36\div4=9$, and $9\times3=27$, 1st numerator.
$36\div6=6$, and $6\times5=30$, 2d "
$36\div9=4$, and $4\times7=28$, 3d "
Ans. $\frac{27}{36}$, $\frac{30}{36}$, and $\frac{28}{36}$

17. The least common denominator of $\frac{3}{7}$, $\frac{1}{6}$, and $\frac{11}{14}$, is 42.
$42\div7=6$, and $6\times3=18$, 1st numerator.
$42\div6=7$, and $7\times1=7$, 2d "
$42\div14=3$, and $3\times11=33$, 3d "
Ans. $\frac{18}{42}$, $\frac{7}{42}$, and $\frac{33}{42}$.

18. The least common denominator of $\frac{8}{9}$, $\frac{7}{8}$, $\frac{5}{12}$, and $\frac{2}{24}$, is 72.
$72\div9=8$, and $8\times8=64$, 1st numerator.
$72\div8=9$, and $9\times7=63$, 2d "
$72\div12=6$, and $6\times5=30$, 3d "
$72\div24=3$, and $3\times2=6$, 4th "
Ans. $\frac{64}{72}$, $\frac{63}{72}$, $\frac{30}{72}$, and $\frac{6}{72}$.

19. The least common denominator of $\frac{1}{5}$, $\frac{3}{8}$, $\frac{7}{10}$, and $\frac{4}{20}$, is 40.
$40\div5=8$, and $8\times1=8$, 1st numerator.
$40\div8=5$, and $5\times3=15$, 2d "
$40\div10=4$, and $4\times7=28$, 3d "
$40\div20=2$, and $2\times4=8$, 4th "
Ans. $\frac{8}{40}$, $\frac{15}{40}$, $\frac{28}{40}$, and $\frac{8}{40}$

20. The least common denominator of
$\frac{2}{12}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, and $\frac{2}{6}$, is 60.
$60 \div 12 = 5$, and $5 \times 2 = 10$, 1st numerator,
$60 \div 3 = 20$, and $20 \times 1 = 20$, 2d "
$60 \div 4 = 15$, and $15 \times 1 = 15$, 3d "
$60 \div 5 = 12$, and $12 \times 1 = 12$, 4th "
$60 \div 6 = 10$, and $10 \times 2 = 20$, 5th "
Ans. $\frac{10}{60}$, $\frac{20}{60}$, $\frac{15}{60}$, $\frac{12}{60}$, and $\frac{20}{60}$.

21. The least commmon denominator of
$\frac{5}{16}$, $\frac{7}{24}$, and $\frac{1}{36}$, is 144.
$144 \div 16 = 9$, and $9 \times 5 = 45$, 1st numerator,
$144 \div 24 = 6$, and $6 \times 7 = 42$, 2d "
$144 \div 36 = 4$, and $4 \times 1 = 4$, 3d "
Ans. $\frac{45}{144}$, $\frac{42}{144}$, and $\frac{4}{144}$

22. $\frac{6}{120} = \frac{1}{20}$. The least common denominator of
$\frac{2}{15}$, $\frac{9}{20}$, and $\frac{1}{20}$, is 60.
$60 \div 15 = 4$, and $4 \times 2 = 8$, 1st numerator,
$60 \div 20 = 3$, and $3 \times 9 = 27$, 2d "
$60 \div 20 = 3$, and $3 \times 1 = 3$, 3d "
Ans. $\frac{8}{60}$, $\frac{27}{60}$, and $\frac{3}{60}$.

23. $\frac{6}{8} = \frac{3}{4}$. The least common denominator of
$\frac{11}{14}$, $\frac{3}{4}$, and $\frac{13}{18}$, is 252.
$252 \div 14 = 18$, and $18 \times 11 = 198$, 1st numerator,
$252 \div 4 = 63$, and $63 \times 3 = 189$, 2d "
$252 \div 18 = 14$, and $14 \times 13 = 182$, 3d "
Ans. $\frac{198}{252}$, $\frac{189}{252}$, and $\frac{182}{252}$.

24. The least common denominator of
$\frac{5}{9}$, $\frac{3}{24}$, and $\frac{13}{45}$, is 360.
$360 \div 9 = 40$, and $40 \times 5 = 200$, 1st numerator,
$360 \div 24 = 15$, and $15 \times 3 = 45$, 2d "
$360 \div 45 = 8$, and $8 \times 13 = 104$, 3d "
Ans. $\frac{200}{360}$, $\frac{45}{360}$, and $\frac{104}{360}$.

25. $\frac{6}{18} = \frac{1}{3}$; $\frac{9}{15} = \frac{3}{5}$; and $\frac{38}{60} = \frac{19}{30}$. The least common denominator of $\frac{1}{3}$, $\frac{3}{5}$, and $\frac{19}{30}$, is 30.
$30 \div 3 = 10$, and $10 \times 1 = 10$, 1st numerator,
$30 \div 5 = 6$, and $6 \times 3 = 18$, 2d "
$30 \div 30 = 1$, and $1 \times 19 = 19$, 3d "
Ans. $\frac{10}{30}$, $\frac{18}{30}$, and $\frac{19}{30}$.

26. $14\frac{1}{2}$, $\frac{3}{7}$, and $19=\frac{29}{2}$, $\frac{3}{7}$, and $\frac{19}{1}$.
The least common denominator is 14.
$14\div2=7$, and $7\times29=203$, 1st numerator,
$14\div7=2$, and $2\times3=6$, 2d "
$14\div1=14$, and $14\times19=266$, 3d "
Ans. $\frac{203}{14}$, $\frac{6}{14}$, and $\frac{266}{14}$.

27. $28\frac{5}{8}$ reduced to an improper fraction $=\frac{229}{8}$;
$\frac{2}{3}$ of $\frac{3}{4}=\frac{\cancel{2}}{\cancel{3}}\times\frac{\cancel{3}}{\cancel{4},\ 2}=\frac{1}{2}$; and
$45=\frac{45}{1}$. The least common denominator of $\frac{229}{8}$, $\frac{1}{2}$, and $\frac{45}{1}$, is 8.
Ans. $\frac{229}{8}$, $\frac{4}{8}$, and $\frac{360}{8}$.

28. $\frac{28}{27}$ of 4, and $19\frac{1}{2}=\frac{112}{27}$, and $\frac{39}{2}$.
The least common denominator is 54.
$54\div27=2$, and $2\times112=224$, 1st numerator,
$54\div2=27$, and $27\times39=1053$, 2d "
Ans. $\frac{224}{54}$, and $\frac{1053}{54}$.

29. $\frac{63}{84}$ reduced to its lowest terms $=\frac{3}{4}$;
$\frac{9}{13}$ of $4\frac{1}{3}=\frac{9}{13}$ of $\frac{13}{3}=\frac{\cancel{9},\ 3}{\cancel{13}}\times\frac{\cancel{13}}{\cancel{3}}=\frac{3}{1}$; and
$63=\frac{63}{1}$. The least common denominator of $\frac{3}{4}$, $\frac{3}{1}$, and $\frac{63}{1}$, is 4.
Ans. $\frac{3}{4}$, $\frac{12}{4}$, and $\frac{252}{4}$.

30. $\frac{\overset{5}{\cancel{35}}}{\underset{3}{\cancel{42}}}$ of $\frac{\cancel{14}}{\cancel{7}}=\frac{5}{3}$, and $29\frac{3}{4}=\frac{119}{4}$.
The least common denominator is 12.
$12\div3=4$, and $4\times5=20$, 1st numerator,
$12\div4=3$, and $3\times119=357$, 2d "
Ans. $\frac{20}{12}$, and $\frac{357}{12}$.

31. $\frac{92}{96}$ reduced to its lowest terms $=\frac{23}{24}$;
$\frac{11}{34}$ of $17=\frac{11}{34}$ of $\frac{17}{1}=\frac{11}{\cancel{34},\ 2}\times\frac{\cancel{17}}{1}=\frac{11}{2}$;
$73\frac{1}{7}=\frac{512}{7}$. The least common denominator of $\frac{23}{24}$, $\frac{11}{2}$, and $\frac{512}{7}$, is 168.
Ans. $\frac{161}{168}$, $\frac{924}{168}$, and $\frac{12288}{168}$.

ADDITION OF FRACTIONS.—(p. 116.)

ART. 127.

4. 3×3= 9, 1st numerator.
5×4=20, 2d "
29 sum.
4×3=12, com. denom.
Ans. $\frac{29}{12}=2\frac{5}{12}$.

5. 3×2×3=18, 1st nu.
1×8×3=24, 2d "
2×8×2=32, 3d "
74 sum.
8×2×3=48 com. den.
Ans. $\frac{74}{48}=1\frac{13}{24}$.

6. 4×15× 5=300, 1st n.
11× 9× 5=495, 2d.
1× 9×15=135, 3d.
930 sum.
9×15×5=675, com. d.
Ans. $\frac{930}{675}=1\frac{17}{45}$.

7. 3× 7×13=273, 1st n.
6×12×13=936, 2d.
9×12× 7=756, 3d.
1965 sum.
12×7×13=1092, c. d.
Ans. $\frac{1965}{1092}=1\frac{291}{364}$.

8. 3×11×18=594, 1st n.
2× 5×18=180, 2d.
6× 5×11=330, 3d.
1104 sum.
5×11×18=990 c. d.
Ans. $\frac{1104}{990}=1\frac{19}{165}$.

9. 1× 7×6= 42, 1st n.
2×10×6=120, 2d.
5×10×7=350, 3d.
512 sum.
10×7×6=420, c. d.
Ans. $\frac{512}{420}=1\frac{23}{105}$.

10. 4× 8×7= 224, 1st n.
7×13×7= 637, 2d.
12×13×8=1248, 3d.
2109 sum.
13×8×7=728 c. d.
Ans. $\frac{2109}{728}=2\frac{653}{728}$.

11. The least com. denom. of $\frac{1}{3}$, $\frac{1}{6}$, $\frac{1}{4}$ $(\frac{2}{8})$, and $\frac{9}{2}$, is 12.
$\frac{1}{3}=\frac{4}{12}$
$\frac{1}{6}=\frac{2}{12}$
$\frac{1}{4}=\frac{3}{12}$
$\frac{9}{2}=\frac{54}{12}$
Ans. $\frac{63}{12}=5\frac{1}{4}$.

12. 1×5×3×7= 105, 1st
3×8×3×7= 504, 2d.
6×8×5×7=1680, 3d.
8×8×5×3= 960, 4th.
3249 sum.
8×5×3×7=840, c. d.
Ans. $\frac{3249}{840}=3\frac{243}{280}$.

13. The least com. denom. of $\frac{3}{4}$ $(\frac{6}{8})$, $\frac{2}{6}$, and $\frac{7}{12}$, is 12.
$\frac{3}{4}=\frac{9}{12}$
$\frac{2}{6}=\frac{4}{12}$
$\frac{7}{12}=\frac{7}{12}$
Ans. $\frac{20}{12}=1\frac{2}{3}$.

14. The least com. denom. of $\frac{3}{5}$, $\frac{2}{3}$, $\frac{7}{32}$, and $\frac{1}{6}$, is 480.
$\frac{3}{5}=\frac{288}{480}$
$\frac{2}{3}=\frac{320}{480}$
$\frac{7}{32}=\frac{105}{480}$
$\frac{1}{6}=\frac{80}{480}$
Ans. $\frac{793}{480}=1\frac{313}{480}$.

15. $\frac{1}{7}$ of $3=\frac{3}{7}=\frac{120}{280}$
$\frac{3}{5}$ of $\frac{1}{3}=\frac{1}{5}=\frac{56}{280}$
$\frac{5}{8}=\frac{175}{280}$
Ans. $\frac{351}{280}=1\frac{71}{280}$.

16. $2\frac{1}{2}=2\frac{3}{6}$
$6\frac{1}{3}=6\frac{2}{6}$
$\frac{2}{3}=\frac{4}{6}$
Ans. $9\frac{9}{6}=9\frac{1}{2}$.

17. $\frac{2}{3}$ of $2=1\frac{1}{3}=1\frac{14}{42}$
$3\frac{1}{2}=3\frac{21}{42}$
$5\frac{2}{7}=5\frac{12}{42}$
Ans. $10\frac{5}{42}$.

18. The least com. denom. of $\frac{8}{10}$ $(\frac{24}{30})$, $\frac{9}{5}$ $(\frac{81}{45})$, $\frac{19}{10}$, is 10.
$\frac{8}{10}=\frac{8}{10}$
$\frac{9}{5}=\frac{18}{10}$
$\frac{19}{10}=\frac{19}{10}$
Ans. $\frac{45}{10}=4\frac{1}{2}$.

19. The least com. denom. of $\frac{1}{8}$, $\frac{53}{12}$, and $\frac{14}{24}$, is 24.
$35\frac{1}{8}=35\frac{3}{24}$
$\frac{53}{12}=4\frac{10}{24}$
$\frac{14}{24}=\frac{14}{24}$
Ans. $40\frac{1}{8}$

20. The least com. denom. of $\frac{25}{4}$, $\frac{1}{2}$, $\frac{2}{3}$, and $\frac{5}{8}$, is 24.
$\frac{25}{4}=6\frac{6}{24}$
$6\frac{1}{2}=6\frac{12}{24}$
$1\frac{2}{3}=1\frac{16}{24}$
$\frac{5}{8}=\frac{15}{24}$
Ans. $15\frac{1}{24}$

21. $25\frac{3}{8}=25\frac{969}{2584}$
$18\frac{11}{19}=18\frac{1496}{2584}$
$\frac{23}{34}=\frac{1748}{2584}$
Ans. $44\frac{1629}{2584}$

22. $\frac{11}{45}$ of $85=\frac{935}{45}=\frac{52360}{2520}$
$\frac{21}{35}$ of $3\frac{5}{8}=\frac{609}{280}=\frac{5481}{2520}$
Ans. $\frac{57841}{2520}=22\frac{2401}{2520}$.

23. $\frac{141}{263}=\frac{67087659}{125135137}$
$\frac{375}{487}=\frac{96356625}{125135137}$
$\frac{831}{977}=\frac{106435311}{125135137}$
$\frac{269879595}{125135137}=2\frac{19609321}{125135137}$
Ans.

24. The least com. denom. of $\frac{7}{8}$, $\frac{3}{7}$, and $\frac{19}{20}$, is 280.
$24\frac{7}{8}=24\frac{245}{280}$
$82\frac{3}{7}=82\frac{120}{280}$
$\frac{19}{20}=\frac{266}{280}$
Ans. $108\frac{71}{280}$

25. $263\frac{3}{5}=263\frac{45}{75}$
$\frac{4}{5}\times\frac{19}{20}\times385\frac{2}{3}=293\frac{8}{75}$
Ans. $556\frac{53}{75}$

26. $47\frac{3}{7}=47\frac{135}{315}$
$83\frac{3}{5}=83\frac{189}{315}$
$68\frac{5}{9}=68\frac{175}{315}$
Ans. $199\frac{184}{315}$ lbs.

27. The least com. denom. of $\frac{5}{12}$, $\frac{9}{16}$, and $\frac{17}{35}$, is 1680.
$85\frac{5}{12}=85\frac{700}{1680}$
$78\frac{9}{16}=78\frac{945}{1680}$
$125\frac{17}{35}=125\frac{816}{1680}$
Ans. $289\frac{781}{1680}$ miles.

28. The least com. denom. of $\frac{7}{8}$, $\frac{9}{16}$, and $\frac{3}{5}$, is 80.
$127\frac{7}{8}=127\frac{70}{80}$
$168\frac{9}{16}=168\frac{45}{80}$
$256\frac{3}{5}=256\frac{48}{80}$
Ans. $553\frac{3}{80}$ yds.

SUBTRACTION OF FRACTIONS.—(p. 117.)

ART. 129.

1—3. Given.

4. $\frac{3}{9}$, or $\frac{1}{3}$.

5. $\frac{3}{12}$, or $\frac{1}{4}$.

6. $\frac{8}{20}$, or $\frac{2}{5}$.

7. $\frac{3}{24}$, or $\frac{1}{8}$.

8. The com. denom. of $\frac{37}{42}$, and $\frac{12}{125}$, is 5250.
$\frac{4625}{5250}-\frac{546}{5250}=\frac{4079}{5250}$ *Ans.*

9. The com. denom. of $\frac{16}{21}$ and $\frac{8}{15}$, is 315.
$\frac{240}{315}-\frac{168}{315}=\frac{72}{315}$, or $\frac{8}{35}$ *Ans.*

10. The com. denom. of $\frac{9}{55}$ and $\frac{1}{15}$, is 825.
$\frac{135}{825}-\frac{55}{825}=\frac{80}{825}$, or $\frac{16}{165}$.

11. The com. denom. of $\frac{2}{7}$ and $\frac{2}{11}$, is 77.
$\frac{22}{77}-\frac{14}{77}=\frac{8}{77}$ *Ans.*

12. The com. denom. of $\frac{27}{35}$ and $\frac{23}{48}$, is 1680.
$\frac{1296}{1680}-\frac{805}{1680}=\frac{491}{1680}$ *Ans.*

13. The least com. denom. of $\frac{14}{75}$ and $\frac{3}{25}$, is 75.
$\frac{14}{75}-\frac{9}{75}=\frac{5}{75}$, or $\frac{1}{15}$ *Ans.*

15.
$$\begin{array}{rr} 12\frac{5}{8}= & 12\frac{5}{8} \\ 7\frac{1}{4}= & \underline{7\frac{2}{8}} \\ & 5\frac{3}{8} \end{array}\ \textit{Ans.}$$

16.
$$\begin{array}{rr} 15\frac{3}{7}= & 15\frac{6}{14} \\ 9\frac{1}{2}= & \underline{9\frac{7}{14}} \\ & 5\frac{13}{14} \end{array}\ \textit{Ans.}$$

17. $25\frac{3}{5}-17\frac{4}{5}=7\frac{4}{5}$ *Ans.*

18.
$$\begin{array}{rr} 37\frac{4}{7}= & 37\frac{16}{28} \\ 19\frac{3}{4}= & \underline{19\frac{21}{28}} \\ & 17\frac{23}{28} \end{array}\ \textit{Ans.}$$

20.
$$\begin{array}{r} 6 \\ \underline{0\frac{2}{3}} \\ 5\frac{1}{3} \end{array}\ \textit{Ans.}$$

21.
$$\begin{array}{l} 65 \\ \underline{25\frac{3}{15}} \\ 39\frac{12}{15}, \text{ or } 39\frac{4}{5}\ \textit{Ans.} \end{array}$$

22.
$$\frac{\cancel{2}}{\cancel{3}} \text{ of } \frac{\cancel{3}}{\cancel{4}, 2}=\frac{1}{2} \text{ or } \frac{3}{6}$$
$$\frac{1}{\cancel{2}} \text{ of } \frac{\cancel{2}}{6}= \qquad \underline{\frac{1}{6}}$$
$$\textit{Ans. } \frac{2}{6} \text{ or } \frac{1}{3}.$$

23.
$$\frac{5}{8} \text{ of } \frac{3}{4}=\frac{15}{32}, \text{ or } \frac{135}{288}$$
$$\frac{1}{3, \cancel{6}} \text{ of } \frac{\cancel{2}}{12}=\frac{1}{36}, \text{ or } \frac{8}{288}$$
Ans. $\frac{135}{288}-\frac{8}{288}=\frac{127}{288}$.

24.
$\frac{3}{5}$ of $10=\frac{3}{5}$ of $\frac{10}{1}=\frac{30}{5}$
$\frac{2}{3}$ of $6=\frac{2}{3}$ of $\frac{6}{1}=\frac{12}{3}$
$\frac{30}{5}-\frac{12}{3}=\frac{90}{15}-\frac{60}{15}=\frac{30}{15}$
$\frac{30}{15}=2$ *Ans.*

Or,
$$\frac{3}{5} \text{ of } 10=\frac{3}{\cancel{5}} \text{ of } \frac{\overset{2}{\cancel{10}}}{1}=6$$
$$\frac{2}{3} \text{ of } 6=\frac{2}{\cancel{3}} \text{ of } \frac{\overset{2}{\cancel{6}}}{1}=\underline{4}$$
Ans. 2

25.
$$\frac{6}{8} \text{ of } 24=\frac{6}{\cancel{8}} \text{ of } \frac{\overset{3}{\cancel{24}}}{1}=18$$
$$\frac{6}{9} \text{ of } 27=\frac{6}{\cancel{9}} \text{ of } \frac{\overset{3}{\cancel{27}}}{1}=\underline{18}$$
Ans. 0

26. $\$85\frac{5}{8}=\$85\frac{5}{8}$
$\$69\frac{3}{4}=\$69\frac{6}{8}$
Ans. $\$15\frac{7}{8}$

27. $246\frac{7}{16}=246\frac{7}{16}$
$\frac{2}{3}$ of $195=130$
Ans. $116\frac{7}{16}$ acres

28. $125\frac{19}{20}=125\frac{76}{80}$
$87\frac{7}{16}=87\frac{35}{80}$
Ans. $38\frac{41}{80}$ yds.

29. $563\frac{7}{8}=563\frac{189}{216}$
$\frac{16}{27}$ of $260\frac{1}{2}=154\frac{80}{216}$
Ans. $409\frac{109}{216}$ lbs.

30. $1673\frac{5}{7}=1673\frac{1035}{1449}$
$\frac{5}{9}$ of $\frac{11}{23}$ of $356=94\frac{854}{1449}$
Ans. $1579\frac{181}{1449}$ bushels.

31 $\frac{2}{3}$ of $\frac{7}{\cancel{8}}$ of $\frac{\overset{32}{\cancel{256}}}{1}=\frac{448}{3}=149\frac{4}{12}$
$\frac{3}{4}$ of $\frac{33}{1}=\frac{99}{4}=24\frac{9}{12}$
Ans. $124\frac{7}{12}$ miles.

32. $\frac{5}{9}$ of $\frac{4}{5}$ of $\frac{1541}{4}=171\frac{14}{63}$
$\frac{4}{7}$ of $\frac{202}{3}=38\frac{30}{63}$
Ans. $132\frac{47}{63}$ rods.

33. $\frac{11}{16}$ of $\frac{19}{20}$ of $\frac{2869}{5}=374\frac{13431}{17600}$
$\frac{13}{44}$ of $\frac{1733}{8}=64\frac{50}{17600}$
Ans. $310\frac{13381}{17600}$ tons.

MULTIPLICATION OF FRACTIONS.—(p. 119.)

ART. 132.

1, 2. Given.
3. $\frac{48}{12}$, or 4.
4. $\frac{84}{8}$, or $10\frac{1}{2}$.
5. $\frac{90}{15}$, or 6.
6. $\frac{120}{20}$, or 6.
7. $\frac{8}{2}$, or 4.
8. $\frac{12}{4}$, or 3.
9. $\frac{30}{4}$, or $7\frac{1}{2}$.
10. $\frac{105}{8}$, or $13\frac{1}{8}$.
11. $\frac{10}{8}$, or $\frac{5}{4}=1\frac{1}{4}$.
12. $\frac{15}{5}$, or 3.
13. $\frac{24}{4}$, or 6.
14. 18.
15. $\frac{432}{15}$, or $28\frac{4}{5}$.
16. $\frac{2160}{25}$, or $86\frac{2}{5}$.
17. $\frac{256}{15}$, or $17\frac{1}{15}$.
18. $\frac{420}{13}$, or $32\frac{4}{13}$.

ART. 133. (p. 121.)

19, 20. Given.
21. 258.
22. 389.

ART. 134.

23, 24. Given.

25. 9.

26. $16\frac{1}{5}$.

27. 25.

28. $32\frac{4}{5}$.

29. 35.

30. $47\frac{3}{11}$.

31. 54.

32. $83\frac{7}{10}$.

ART. 134. *a.* (p. 122.)

33, 34. Given.

35. 657.

36. $916\frac{2}{3}$.

ART. 135.

37, 38. Given.

39. $\frac{4}{21}$.

40. $\frac{35}{72}$.

41. $\frac{5}{24}$.

42. $\frac{13}{20}$.

ART. 136. (p. 123.)

43—45 Given.

Note.—In multiplication of fractions, it is sometimes more convenient to arrange the terms for cancellation on each side of a perpendicular line, as in reduction of compound fractions to simple ones. (Art. 124. Ex. 55.)

46.

$$\begin{array}{r|l} \cancel{1}\cancel{2} & \cancel{5} \\ \cancel{5} & \cancel{4} \\ 7 & \cancel{3} \\ \hline 7 & 1=\frac{1}{7}\ \textit{Ans.} \end{array}$$

47.

$$\begin{array}{r|l} \cancel{3} & \cancel{8},\ \cancel{2} \\ \cancel{1}\cancel{3} & \cancel{3} \\ \cancel{4} & 1 \\ 6,\ \cancel{1}\cancel{2} & \cancel{1}\cancel{3} \\ \hline 6 & 1=\frac{1}{6}\ \textit{Ans} \end{array}$$

48.

$$\begin{array}{r|l} \cancel{8}\cancel{0} & \cancel{7}\cancel{5} \\ \cancel{2}\cancel{5} & \cancel{1}\cancel{6} \\ \cancel{3} & \cancel{5} \\ 3,\ \cancel{9} & 4 \\ 7 & \cancel{3} \\ \hline 21 & 4=\frac{4}{21}\ \textit{Ans} \end{array}$$

49.

$$\begin{array}{r|l} \cancel{6}\cancel{3} & \cancel{3}\cancel{7} \\ 14 & \cancel{9} \\ \cancel{3}\cancel{7} & \cancel{7} \\ 7,\ \cancel{2}\cancel{1} & \cancel{6},\ 3 \\ \cancel{2} & \cancel{3} \\ \hline 98 & 3=\frac{3}{98}\ \textit{Ans} \end{array}$$

ART. 137.

50. Given.

51. $9\frac{3}{4}=\frac{39}{4}$, $7\frac{1}{2}=\frac{15}{2}$.
$\frac{39}{4}\times\frac{15}{2}=\frac{585}{8}=73$

52. $28\frac{2}{5}=\frac{142}{5}$, $17\frac{2}{3}=\frac{5}{3}$
$\frac{142}{5}\times\frac{53}{3}=\frac{7526}{15}=$

53. $85\frac{7}{8}=\frac{687}{8}$, $23\frac{2}{7}=1$
$\frac{687}{8}\times\frac{163}{7}=\frac{11198}{56}$
$1999\frac{37}{56}$ *Ans.*

54. $93\frac{7}{8}=\frac{751}{8}$, $46\frac{4}{5}=2$
$\frac{751}{8}\times\frac{234}{5}=\frac{17573}{40}$
$4393\frac{7}{20}$ *Ans.*

EXAMPLES FOR PRACTICE.—(p. 124.)

1. \$4.

2. $10\frac{1}{2}=\frac{21}{2}$.
$\frac{21}{2}\times\frac{3}{5}=\frac{63}{10}$, or $6\frac{3}{10}$ cwt.
Ans.

3. $12\frac{1}{4}=\frac{49}{4}$.
$\frac{49}{4}\times\frac{3}{4}=\$9\frac{3}{16}$ *Ans.*

4. $15\frac{1}{3}=\frac{46}{3}$.
$\frac{46}{3}\times\frac{4}{7}=8\frac{16}{21}$ bbls. *A*

5. $12\frac{3}{4}=\frac{51}{4}$.
$\frac{51}{4}\times\frac{7}{8}=11\frac{5}{32}$ cords. *Ans.*

6. $29\frac{2}{3}=\frac{89}{3}$.
$\frac{89}{3}\times\frac{11}{12}=27\frac{7}{36}$ a. *Ans.*

7. $44\frac{4}{5}$ shillings.

8. $61\frac{1}{4}$ shillings.

9. $\$96\frac{1}{4}$.

10. $15\frac{4}{5}=\frac{79}{5}$.
$\frac{79}{5}\times\frac{4}{9}=\$7\frac{1}{45}$.

11. $\$12\frac{21}{32}$.

12. 136 cts.

13. $112\frac{1}{2}$ cts.

14. 235 pence.

15. $11\frac{1}{9}=\frac{100}{9}$; $1\frac{1}{2}=\frac{3}{2}$.

$$\frac{100}{3,\ \cancel{9}}\times\frac{\cancel{3}}{2}=\frac{100}{6}\text{ or }\$16\tfrac{2}{3}.$$

Ans.

16. $12\frac{1}{2}=\frac{25}{2}$; $2\frac{2}{3}=\frac{8}{3}$.

$$\frac{25}{\cancel{2}}\times\frac{\cancel{8},\ 4}{3}=\frac{100}{3}\text{ or }33\tfrac{1}{3}\text{ cts.}$$

Ans.

17. $61\frac{7}{8}$ shillings.

18. 360 cents.

19. $292\frac{1}{2}$ cents.

20. $216\frac{3}{4}$ cents.

21. $56.

22. $157\frac{1}{2}$ cents.

23. $\$16\frac{1}{2}$.

24. $8\frac{3}{4}=\frac{35}{4}$.

$$\frac{7,\ \cancel{35}}{4}\times\frac{5}{\cancel{10},\ 2}=\$4\tfrac{3}{8}\ \textit{Ans.}$$

25. $9\frac{7}{9}=\frac{88}{9}$.

$$\frac{11,\ \cancel{88}}{3,\ \cancel{9}}\times\frac{\cancel{3}}{\cancel{8}}=\frac{11}{3}\text{ or }\$3\tfrac{2}{3}.$$

Ans.

26. $\$\frac{27}{40}$.

27. $\$\frac{15}{28}$.

28. $1237\frac{1}{2}$ cents. *Ans.*

29. $62\frac{1}{2}=\frac{125}{2}$, and $12\frac{1}{2}=\frac{25}{2}$
$\frac{125}{2}\times\frac{25}{2}=\frac{3125}{4}=781\frac{1}{4}$c.

30. $18\frac{1}{2}=\frac{37}{2}$, and $16\frac{1}{4}=\frac{65}{4}$.
$\frac{37}{2}\times\frac{65}{4}=300\frac{5}{8}$ cts. *Ans.*

31. $243\frac{3}{4}$ cents.

32. $31\frac{1}{2}=\frac{63}{2}$.
$\frac{63}{2}\times\frac{1}{9}=\frac{63}{18}=\$3\frac{1}{2}$ *Ans.*

33. $18\frac{1}{2}=\frac{37}{2}$.
$\frac{37}{2}\times\frac{7}{12}=\$10\frac{19}{24}$ *Ans.*

34. $3\frac{3}{4}=\frac{15}{4}$; $7\frac{1}{2}=\frac{15}{2}$.
$\frac{15}{4}\times\frac{15}{2}=28\frac{1}{8}$ shillings.

35. $14\frac{3}{5}=\frac{73}{5}$; $18\frac{3}{4}=\frac{75}{4}$.
$\frac{73}{5}\times\frac{75}{4}=273\frac{3}{4}$ cents.

36. $7\frac{3}{8}=\frac{59}{8}$; $8\frac{3}{8}=\frac{67}{8}$.
$\frac{59}{8}\times\frac{67}{8}=61\frac{49}{64}$ shillings.

37. $47\frac{4}{5}=\frac{239}{5}$.
$\frac{239}{5}\times\frac{7}{8}=\$41\frac{33}{40}$ *Ans.*

38. $63\frac{3}{4}=\frac{255}{4}$; $9\frac{3}{4}=\frac{39}{4}$.
$\frac{255}{4}\times\frac{39}{4}=621\frac{9}{16}$ cents.

39. $22\frac{3}{4}=\frac{91}{4}$; $3\frac{2}{8}=\frac{26}{8}$.
$\frac{91}{4}\times\frac{26}{8}=\$73\frac{15}{16}$.

40. $39\frac{3}{4}=\frac{159}{4}$; $1\frac{2}{3}=\frac{5}{3}$.

$$\frac{53,\ \cancel{159}}{4}\times\frac{5}{\cancel{3}}=\frac{265}{4}\text{ or }66\tfrac{1}{4}\text{ s.}$$

41. $25\frac{1}{4}=\frac{101}{4}$; $15\frac{1}{2}=\frac{31}{2}$.
$\frac{101}{4}\times\frac{31}{2}=391\frac{3}{8}$ cents.

42. $35\frac{3}{5}=\frac{178}{5}$; $18\frac{1}{3}=\frac{55}{3}$.

$$\frac{178}{\cancel{5}}\times\frac{\overset{11}{\cancel{55}}}{3}=\frac{1958}{3}\text{ or }652\tfrac{2}{3}\text{ s}$$

43. $175\frac{1}{2}=\frac{351}{2}$.
$\frac{351}{2}\times\frac{3}{8}=\$65\frac{13}{16}$ *Ans.*

44. $38\frac{3}{4}=\frac{155}{4}$; $15\frac{7}{8}=\frac{127}{8}$.
$\frac{155}{4}\times\frac{127}{8}=\frac{19685}{32}$, or
$\$615\frac{5}{32}$ *Ans.*

45. $42\frac{1}{2}=\frac{85}{2}$; $17\frac{1}{2}=\frac{35}{2}$.
$\frac{85}{2}\times\frac{35}{2}=\frac{2975}{4}$, or
$749\frac{3}{4}$ miles. *Ans.*

46. $85\frac{26}{35}=\frac{3001}{35}$; $\frac{3}{4}$ of $19=\frac{57}{4}$.
$\frac{3001}{35}\times\frac{57}{4}=\frac{171057}{140}=1221\frac{117}{140}$. *Ans.*

47. $126\times\frac{165}{9}$ ($\frac{5}{9}$ of 33) $=\frac{20790}{9}=2310$. *Ans.*

48. $23,\ \frac{\cancel{46}}{75}\times\frac{29}{\cancel{2}}(14\frac{1}{2})=\frac{667}{75}=8\frac{67}{75}$. *Ans.*

49. $69\frac{3}{4}=\frac{279}{4}$; and $\frac{279}{4}\times\frac{15}{17}=\frac{4185}{68}=61\frac{37}{68}$. *Ans.*

50. $46\frac{3}{4}=\frac{187}{4}$; $31\frac{7}{8}=\frac{255}{8}$.
$\frac{187}{4}\times\frac{255}{8}=\frac{47685}{32}=1490\frac{5}{32}$. *Ans.*

51. $\frac{14}{19}\times\frac{68}{3}$ ($\frac{2}{3}$ of 34) $=\frac{952}{57}=16\frac{40}{57}$. *Ans.*

52. $\frac{\cancel{5}}{9}$ of $\frac{\cancel{3}}{\cancel{4}}\times\frac{2}{\cancel{3}}$ of $\frac{\cancel{4}}{\cancel{5}}=\frac{2}{9}$. *Ans.*

53. $\frac{6}{\cancel{7}}$ of $\frac{9}{1}\times\frac{3}{5}$ of $\frac{\cancel{7}}{1}=\frac{162}{5}=32\frac{2}{5}$. *Ans.*

54. $\frac{7}{6}$ of $\frac{7}{2}$ $(3\frac{1}{2})\times\frac{71}{4}(17\frac{3}{4})=\frac{3479}{48}=72\frac{23}{48}$. *Ans.*

55. $18\frac{1}{7}=\frac{127}{7}$; $24\frac{1}{2}=\frac{49}{2}$.
$\frac{\cancel{5}}{9}\times\frac{127}{\cancel{7}}\times\frac{\cancel{4},\,2}{\cancel{5}}\times\frac{\cancel{49},\,7}{\cancel{2}}=\frac{1778}{9}=197\frac{5}{9}$. *Ans.*

56. $16\frac{2}{3}=\frac{50}{3}$; and $\frac{\cancel{50},\,10}{\cancel{3}}\times\frac{4}{\cancel{5}}$ of $\frac{\cancel{6},\,2}{1}=80$. *Ans.*

57. $\frac{7}{9}$ of $\frac{35}{4}$ $(8\frac{3}{4})\times\frac{53}{64}=\frac{12985}{2304}=5\frac{1465}{2304}$. *Ans.*

58. $\frac{7}{8}$ of $\frac{19}{2}$ $(9\frac{1}{2})\times\frac{35}{4}(8\frac{3}{4})=\frac{4655}{64}=72\frac{47}{64}$. *Ans.*

59. $146\frac{3}{4}=\frac{587}{4}$; and $\frac{587}{4}\times\frac{11}{13}$ of
$\frac{21}{35}=\frac{135597}{1820}=74\frac{131}{260}$. *Ans.*

60. $256\frac{1}{9}=\frac{2305}{9}$; $25\frac{1}{6}=\frac{151}{6}$.
$\frac{2305}{9}\times\frac{5}{7}\times\frac{151}{6}=\frac{1740275}{378}=4603\frac{341}{378}$. *Ans.*

61. $217\frac{1}{8}=\frac{1737}{8}$; and $\frac{1737}{\cancel{8}}\times\frac{\cancel{2}}{\cancel{3}}\times\frac{\cancel{3}}{\cancel{4},\,2}\times\frac{\cancel{8}}{1}=$
$\frac{1737}{2}=868\frac{1}{2}$. *Ans.*

62. $316\frac{13}{65}=\frac{20553}{65}$; and $\frac{20553}{65}\times\frac{6}{\cancel{19}}$ of
$\frac{\cancel{38},\,2}{1}=\frac{246636}{65}=3794\frac{2}{5}$. *Ans.*

63. $\frac{\cancel{856},\,2}{943}\times\frac{5}{\cancel{7}}$ of $\frac{\cancel{119},\,17}{\cancel{428}}=\frac{170}{943}$. *Ans.*

64. $\frac{\cancel{786},\,\cancel{2}}{967}\times\frac{3}{\cancel{10},\,\cancel{5}}$ of $\frac{\cancel{245},\,49}{\cancel{393}}=\frac{147}{967}$. *Ans.*

65. $468\frac{5}{11}=\frac{5153}{11}$; and $\frac{5153}{11}\times\frac{3}{4}$ of $\frac{21}{47}=\frac{324639}{2068}=156\frac{2031}{2068}$. *Ans.*

66. $\frac{\cancel{3}}{4}$ of $\frac{\cancel{2}}{\cancel{3}}$ of $\frac{7}{\cancel{11}}$ of $\frac{19}{\cancel{20},\,2}$ of $\frac{\cancel{11}}{1}\times\frac{7}{8}$ of $\frac{\cancel{5}}{\cancel{6},\,2}$ of $\frac{\cancel{45},\,15}{1}=\frac{13965}{128}=109\frac{13}{128}$. *Ans.*

67. $\frac{\cancel{5}}{7}$ of $\frac{6}{\cancel{13}}$ of $\frac{\cancel{26}}{35}$ of $\frac{1}{\cancel{2}}$ of $\frac{29}{1}\times\frac{\cancel{11}}{\cancel{15}}$ of $\frac{\cancel{6},\,3}{\cancel{10},\,5}$ of $\frac{\cancel{3}}{\cancel{11}}=\frac{522}{1225}$. *Ans*

68. $\frac{\cancel{7}}{\cancel{8},\,2}$ of $\frac{\cancel{14}}{\cancel{42}}$ of $\frac{\cancel{8}}{\cancel{56}}$ of $\frac{\cancel{33}}{2}(16\frac{1}{2})\times\frac{21}{\cancel{33}}$ of $\frac{\cancel{28},\,7}{\cancel{35},\,5}$ of $\frac{\cancel{3}}{8}$ of $\frac{\cancel{49},\,7}{1}=\frac{1029}{160}=6\frac{69}{160}$. *Ans.*

DIVISION OF FRACTIONS.—(p. 126.)

ART. 138.

1—3. Given.
4. $\frac{2}{15}$.
5. $\frac{2}{19}$.
6. $\frac{5}{21}$.
7. $\frac{17}{132}$.
8. $\frac{1}{8}$.
9. $\frac{9}{85}$.
10. $\frac{5}{221}$.
11. $\frac{5}{238}$.

ART. 139. (p. 128.)

12—15. Given.
16. $22\frac{1}{2}$.
17. $\frac{15}{35}=\frac{3}{7}$.
18. $1\frac{371}{629}$.
19. $\frac{840}{1083}=\frac{280}{361}$.

ART. 140. (p. 129.)

20, 21. Given.

22.
$$\begin{array}{r|l} 7 & \cancel{4} \\ 1 & 6 \\ 1 & 6 \\ \cancel{4} & 1 \\ \hline 7 & 36 \end{array}=\frac{36}{7},\text{ or }5\frac{1}{7}.$$

Or, $\frac{4}{7}$ of $\frac{6}{1}=\frac{24}{7}$,
and $\frac{1}{6}$ of $\frac{4}{1}=\frac{4}{6}$.
Then
$$\begin{array}{r|l} 7 & \cancel{24},\ 6 \\ \cancel{4} & 6 \\ \hline 7 & 36 \end{array}=\frac{36}{7},\text{ or }5\frac{1}{7}.$$

23 $$\begin{array}{r|l} \cancel{3} & 13 \\ 1 & \cancel{3} \\ 33 & 4 \\ \hline 33 & 52 = 1\frac{19}{33}.\ \textit{Ans.} \end{array}$$

24. $$\begin{array}{r|l} \cancel{7} & 1 \\ 28 & 25 \\ 1 & 3 \\ 4 & \cancel{7} \\ \hline 112 & 75 = \frac{75}{112}.\ \textit{Ans.} \end{array}$$

25. $$\begin{array}{r|l} 12 & 5 \\ 4 & \cancel{3} \\ \cancel{3} & 7 \\ \hline 48 & 35 = \frac{35}{48}.\ \textit{Ans.} \end{array}$$

26 $$\begin{array}{r|l} \cancel{9} & 7 \\ 4 & 63 \\ 34 & \cancel{9} \\ \hline 136 & 441 = 3\frac{33}{136}.\ \textit{Ans.} \end{array}$$

27. $$\begin{array}{r|l} 9 & \cancel{7} \\ 23 & 37 \\ \cancel{7} & 40 \\ \hline 207 & 1480 = 7\frac{31}{207}\ \textit{Ans.} \end{array}$$

28. $$\begin{array}{r|l} 5 & \cancel{3} \\ \cancel{3} & 84 \\ 19 & 7 \\ \hline 95 & 588 = 6\frac{18}{95}. \end{array}$$

29. $$\begin{array}{r|l} \cancel{4} & 101 \\ 1 & \cancel{4} \\ 26 & 1 \\ \hline 26 & 101 = 3\frac{23}{26}. \end{array}$$

ART. 141. (p. 130.)

30, 31. Given.
32. $87\frac{1}{2}$.
33. $75\frac{1}{5}$.
34. $212\frac{1}{7}$.
35. $323\frac{2}{11}$.
36. $128\frac{5}{7}=\frac{901}{7}$.
$\frac{475}{1}\times\frac{7}{901}=\frac{3325}{901}$,
$\frac{3325}{901}=3\frac{622}{901}$. *Ans*
37. $241\frac{7}{9}=\frac{2176}{9}$.
$\frac{643}{1}\times\frac{9}{2176}=\frac{5787}{2176}$,
$\frac{5787}{2176}=2\frac{1435}{2176}$. *Ans.*

EXAMPLES FOR PRACTICE.—(p. 130.)

1. 130 bushels.
2. 104 apples.
3. 145 lbs.
4. 172 bushels.
5. 124 gallons.
6 $87\frac{3}{11}$ yards.
7. $4\frac{5}{8}=\frac{37}{8}$; $25\frac{1}{2}=\frac{51}{2}$.
$\frac{51}{\cancel{2}}\times\frac{\cancel{8},4}{37}=\frac{204}{37}$, or $5\frac{19}{37}$ yards.
8. $6\frac{1}{4}=\frac{25}{4}$; $62\frac{1}{2}=\frac{125}{2}$.
$5,\frac{\cancel{125}}{\cancel{2}}\times\frac{\cancel{4},2}{\cancel{25}}=10$ miles.
9. $12\frac{1}{2}=\frac{25}{2}$; $67\frac{3}{4}=\frac{27}{4}$
$\frac{271}{\cancel{4},2}\times\frac{\cancel{2}}{25}=\frac{271}{50}$, o
10. $16\frac{1}{4}=\frac{65}{4}$; $87\frac{1}{2}=\frac{17}{2}$
$35,\frac{\cancel{175}}{\cancel{2}}\times\frac{\cancel{4},2}{\cancel{65},13}=\frac{7}{1}$
$5\frac{5}{13}$ lbs. *Ans.*
11. $6\frac{1}{2}=\frac{13}{2}$; $67\frac{1}{2}=\frac{135}{2}$.
$\frac{135}{\cancel{2}}\times\frac{\cancel{2}}{13}=\frac{135}{13}$ or 1
(

12. $11\frac{3}{5}=\frac{58}{5}$; $95\frac{1}{2}=\frac{191}{2}$.
$\frac{191}{2}\times\frac{5}{58}=\frac{955}{116}$, or
$8\frac{27}{116}$ bbls. *Ans.*

13. $15\frac{1}{2}=\frac{31}{2}$; $124\frac{5}{8}=\frac{997}{8}$.
$\frac{997}{4,\ \cancel{8}}\times\frac{\cancel{2}}{31}=\frac{997}{124}$, or
$\$8\frac{5}{124}$. *Ans.*

14. $13\frac{1}{2}=\frac{27}{2}$; $94\frac{1}{2}=\frac{189}{2}$.
$\frac{7,\ \cancel{189}}{\cancel{2}}\times\frac{\cancel{2}}{\cancel{27}}=7$ cts. *Ans.*

15. $15\frac{3}{4}=\frac{63}{4}$; $145\frac{5}{12}=\frac{1745}{12}$.
$\frac{1745}{3,\ \cancel{12}}\times\frac{\cancel{4}}{63}=\frac{1745}{189}$, or
$9\frac{44}{189}$ shillings. *Ans.*

16. $15\frac{1}{8}=\frac{121}{8}$; $24\frac{1}{4}=\frac{97}{4}$.
$\frac{97}{\cancel{4}}\times\frac{\cancel{8},\ 2}{121}=\frac{194}{121}$, or
$\$1\frac{73}{121}$. *Ans.*

17. $30\frac{1}{4}=\frac{121}{4}$; $181\frac{1}{2}=\frac{363}{2}$.
$\frac{3,\ \cancel{363}}{\cancel{2}}\times\frac{\cancel{4},\ 2}{\cancel{121}}=\$6$. *Ans.*

18. $\$2\frac{523}{626}$.

19. $16\frac{1}{2}=\frac{33}{2}$; $196\frac{1}{8}=\frac{1569}{8}$.
$\frac{523,\ \cancel{1569}}{4,\ \cancel{8}}\times\frac{\cancel{2}}{\cancel{33},\ 11}=\frac{523}{44}$
or $11\frac{39}{44}$ tons. *Ans.*

20. $17\frac{1}{8}=\frac{137}{8}$.
$\frac{1500}{1}\times\frac{8}{137}=\frac{12000}{137}=$
$87\frac{81}{137}$ sacks. *Ans.*

21. $15\frac{7}{8}=\frac{127}{8}$.
$\frac{2500}{1}\times\frac{8}{127}=\frac{20000}{127}=$
$157\frac{61}{127}$ bales. *Ans.*

22. $145\frac{7}{12}=\frac{1747}{12}$.
$\frac{1747}{12}\div16=\frac{1747}{192}=9\frac{19}{192}$.

23. $16\frac{75}{95}=16\frac{15}{19}=\frac{319}{19}$.
$\frac{319}{19}\div25=\frac{319}{475}$. *Ans.*

24. $185\frac{115}{153}$.

25. $68\frac{11}{15}=\frac{1031}{15}$.
$\frac{12563}{1}\times\frac{15}{1031}=\frac{183445}{1031}=$
$182\frac{803}{1031}$. *Ans.*

26. $85\frac{63}{73}=\frac{6268}{73}$; $18\frac{4}{9}=\frac{166}{9}$
$\frac{6268}{73}\times\frac{9}{166}=\frac{56412}{12118}$, or
$4\frac{3970}{6059}$. *Ans.*

27. $105\frac{2}{66}=\frac{6932}{66}$; $82\frac{6}{25}=\frac{2056}{25}$.
$\frac{\overset{1733}{\cancel{6932}}}{66}\times\frac{25}{\underset{514}{\cancel{2056}}}=\frac{43325}{33924}$, or
$1\frac{9401}{33924}$. *Ans.*

28. $6\frac{1}{2}=\frac{13}{2}$ divisor.
$\frac{\cancel{3}}{5}\times\frac{8}{\cancel{15},\ 5}\times\frac{2}{13}=\frac{16}{325}$. *Ans.*

29. $\frac{4}{7}\times\frac{\cancel{16},\ 2}{1}\times\frac{3}{\cancel{2}}\times\frac{5}{\cancel{4}}=\frac{120}{7}$,
or $17\frac{1}{7}$. *Ans.*

30. $\frac{9}{10}$ of $30=27$.
$27\div19=1\frac{8}{19}$. *Ans.*

31. $\frac{3}{7}$ of $\frac{2}{9}=\frac{6}{63}$, or $\frac{2}{21}$.
$\frac{2}{21}\div21=\frac{2}{441}$. *Ans.*

32. $\frac{8}{11}$ of $\frac{19}{20}=\frac{152}{220}$; $\frac{2}{7}$ of $31=\frac{62}{7}$.
$\frac{152}{220}\times\frac{7}{62}=\frac{1064}{13640}=$
$\frac{133}{1705}$. *Ans.*

33. $\frac{4}{15}\times\frac{2}{21}\times\frac{2}{1}\times\frac{8}{5}=$
$\frac{128}{1575}$. *Ans.*

34. $\frac{\cancel{24}}{5}\times\frac{3}{\cancel{2}}$ of $\frac{1}{\cancel{12}}=\frac{3}{5}$. *Ans.*

35.
$$\begin{array}{r|l} 2,\ \cancel{8} & \cancel{1791} \\ 17,\ \cancel{153} & \cancel{4}.\ 199 \\ \hline 34 & 199 \end{array}=5\frac{29}{34}.\ \textit{Ans.}$$

36. $\frac{12}{23}\times\frac{2}{37}=\frac{24}{851}$. *Ans.*

37. $\frac{6}{15}\times\frac{1}{48}=\frac{1}{120}$. *Ans.*

38. $$\begin{array}{r|l} 3 & \cancel{7}\cancel{6},\ 19 \\ 7,\ \cancel{2}\cancel{8} & 5 \\ \hline 21 & 95 = 4\frac{11}{21}.\ \textit{Ans.} \end{array}$$

39. $42\frac{1}{4} = \frac{169}{4}$; $\frac{4}{5}$ of $53\frac{1}{3} = \frac{4}{5}$ of $\frac{160}{3}$.

$$\frac{169}{4} \times \frac{\cancel{5}}{4} \times \frac{3}{\cancel{1}\cancel{6}\cancel{0},\ 32} = \frac{507}{512}.$$ *Ans.*

40. $$\begin{array}{r|l} \cancel{8} & \cancel{7} \\ 4 & \cancel{3} \\ \cancel{1}\cancel{4} & \cancel{8} \\ \cancel{5} & \cancel{2} \\ \cancel{2}\cancel{0} & 19 \\ \cancel{3} & \cancel{5} \\ 13 & \cancel{2}\cancel{0} \\ \hline 52 & 19 = \frac{19}{52}.\ \textit{Ans.} \end{array}$$

41. $$\begin{array}{r|l} \cancel{1}\cancel{2} & \cancel{5} \\ \cancel{9} & \cancel{8},\ \cancel{4},\ \cancel{2} \\ 3,\ \cancel{1}\cancel{5} & \cancel{1}\cancel{2} \\ \cancel{2},\ \cancel{1}\cancel{0} & \cancel{9} \\ 7,\ \cancel{1}\cancel{4} & \cancel{2}\cancel{5},\ \cancel{5} \\ 3,\ \cancel{1}\cancel{5} & 11 \\ 9,\ \cancel{1}\cancel{8} & 1 \\ \hline 567 & 11 = \frac{11}{567}.\ \textit{Ans.} \end{array}$$

42. $$\begin{array}{r|l} 25 & 13 \\ \cancel{4}\cancel{3} & 16 \\ 1 & \cancel{6}\cancel{7} \\ 31 & \cancel{4}\cancel{3} \\ \cancel{6}\cancel{7} & \cancel{9}\cancel{5},\ 19 \\ 5,\ \cancel{2}\cancel{5} & 1 \\ \hline 3875 & 3952. \end{array}$$

$1\frac{77}{3875}$. *Ans.*

43. $$\begin{array}{r|l} \cancel{2}\cancel{4} & 23 \\ \cancel{6}\cancel{0} & \cancel{3}\cancel{1} \\ 2 & 83 \\ 82 & \cancel{6}\cancel{0} \\ \cancel{3}\cancel{1} & \cancel{2}\cancel{4} \\ 31 & 1 \\ \hline 5084 & 1909. \end{array}$$

$\frac{1909}{5084}$. *Ans.*

44. $$\begin{array}{r|l} 65 & \cancel{4}\cancel{7} \\ \cancel{4}\cancel{7} & \cancel{2}\cancel{3} \\ \cancel{9}\cancel{1} & \cancel{8}\cancel{4} \\ \cancel{5} & \cancel{4}\cancel{1}\cancel{4},\ \cancel{1}\cancel{3}\cancel{8} \\ \cancel{3},\ \cancel{6}\cancel{9} & \cancel{9}\cancel{1},\ 46 \\ \cancel{8}\cancel{4} & 23 \\ 71,\ \cancel{2}\cancel{1}\cancel{3} & \cancel{5} \\ \hline 4615 & 1058 = \frac{1058}{4615}. \end{array}$$

COMPLEX FRACTIONS.—(p. 132.)

Art. 143.

1, 2. Given.

3. $\frac{6}{3\frac{1}{2}} = 6 \div \frac{7}{2}$.

$6 \times \frac{2}{7} = \frac{12}{7}$. *Ans.*

4. $\frac{5\frac{1}{2}}{6} = \frac{11}{2} \div 6$.

$\frac{11}{2} \times \frac{1}{6} = \frac{11}{12}$. *Ans.*

5. $\frac{\frac{3}{5}}{\frac{2}{3}} = \frac{3}{5} \times \frac{3}{2}$, or $\frac{9}{10}$. *Ans*

6. $\frac{4\frac{5}{9}}{6} = \frac{41}{9} \div 6$.

$\frac{41}{9} \times \frac{1}{6} = \frac{41}{54}$. *Ans.*

7. $\frac{8}{5\frac{1}{2}} = 8 \div \frac{11}{2}$.

$8 \times \frac{2}{11} = \frac{16}{11}$. *Ans.*

8. $\dfrac{9\frac{1}{2}}{7\frac{1}{8}}=\frac{19}{2}\div\frac{57}{8}$.

$\dfrac{\cancel{19}}{\cancel{2}}\times\dfrac{\cancel{8},\ 4}{\cancel{57}\ 3}=\frac{4}{3}$. *Ans.*

9. $\dfrac{12\frac{1}{4}}{6\frac{1}{9}}=\frac{49}{4}\div\frac{55}{9}$.

$\frac{49}{4}\times\frac{9}{55}=\frac{441}{220}$. *Ans.*

10. $\dfrac{18\frac{1}{3}}{12\frac{1}{2}}=\frac{55}{3}\div\frac{25}{2}$.

$\dfrac{11,\ \cancel{55}}{3}\times\dfrac{2}{\cancel{25},\ 5}=\frac{22}{15}$. *Ans.*

11. $\dfrac{20\frac{3}{8}}{25\frac{3}{4}}=\frac{163}{8}\div\frac{103}{4}$.

$\dfrac{163}{\cancel{8},\ 2}\times\dfrac{\cancel{4}}{103}=\frac{163}{206}$. *Ans.*

12. $\dfrac{\frac{23}{27}}{\frac{31}{35}}=\frac{23}{27}\div\frac{31}{35}$.

$\frac{23}{27}\times\frac{35}{31}=\frac{805}{837}$. *Ans.*

13. $\dfrac{251}{\frac{4}{5}}=251\div\frac{4}{5}$.

$251\times\frac{5}{4}=\frac{1255}{4}$. *Ans.*

14. $\dfrac{\frac{25}{35}}{476}=\frac{25}{35}\div476$.

$\dfrac{5,\ \cancel{25}}{7,\ \cancel{35}}\times\dfrac{1}{476}=\frac{5}{3332}$. *Ans.*

Art. 144. (p. 133.)

1. $\dfrac{4\frac{1}{2}}{8}=\frac{9}{16}$

$\dfrac{12}{5\frac{1}{3}}=\frac{36}{16}$.

$\frac{9}{16}+\frac{36}{16}=\frac{45}{16}$, or $2\frac{13}{16}$. *Ans.*

2. $\dfrac{\frac{22}{34}}{\frac{18}{25}}=\frac{275}{306}$, or $\frac{23650}{26316}$;

$\dfrac{25\frac{1}{2}}{43}=\frac{51}{86}$, or $\frac{15606}{26316}$.

$\frac{23650}{26316}+\frac{15606}{26316}=1\frac{3235}{6579}$.

3. $\dfrac{12\frac{3}{4}}{16\frac{5}{7}}=\frac{119}{156}$, or $\frac{27608}{36192}$;

$\dfrac{22\frac{1}{2}}{38\frac{2}{3}}=\frac{135}{232}$, or $\frac{21060}{36192}$.

$\frac{27608}{36192}+\frac{21060}{36192}=1\frac{3119}{9048}$. *Ans.*

4. $\dfrac{51\frac{11}{12}}{63\frac{14}{15}}=\frac{3115}{3836}$, or $\frac{429525}{517860}$;

$\dfrac{17\frac{4}{5}}{13\frac{1}{2}}=\frac{178}{135}$, or $\frac{682808}{517860}$.

$\frac{429525}{517860}+\frac{682808}{517860}=2\frac{9659}{73980}$. *Ans.*

5. $\dfrac{13\frac{4}{5}}{17\frac{3}{7}}=\frac{483}{610}$, or $\frac{3381}{4270}$;

$\dfrac{2\frac{1}{2}}{8\frac{3}{4}}=\frac{2}{7}$, or $\frac{1220}{4270}$.

$\frac{3381}{4270}-\frac{1220}{4270}=\frac{2161}{4270}$. *Ans.*

6. $\dfrac{18\frac{5}{9}}{21}=\frac{167}{189}$, or $\frac{7849}{8883}$;

$\dfrac{11}{23\frac{1}{2}}=\frac{22}{47}$, or $\frac{4158}{8883}$.

$\frac{7849}{8883}-\frac{4158}{8883}=\frac{3691}{8883}$. *Ans.*

7. $\dfrac{25\frac{3}{4}}{\frac{1}{12}}=\frac{1236}{4}$, or $\frac{365856}{13024}$;

$\dfrac{13\frac{3}{4}}{24\frac{2}{3}}=\frac{165}{296}$, or $\frac{7260}{13024}$.

$\frac{365856}{13024}-\frac{7260}{13024}=27\frac{1737}{3256}$

8. $\dfrac{48\frac{13}{27}}{51\frac{16}{35}}=\frac{45815}{48627}$, or $\frac{91630}{97254}$;

$\dfrac{19\frac{1}{2}}{37\frac{2}{4}}=\frac{1}{2}$, or $\frac{48627}{97254}$.

$\frac{91630}{97254}-\frac{48627}{97254}=\frac{43003}{97254}$.

9.
$$\begin{array}{r|l} 3 & \cancel{7} \\ \cancel{9} & 4 \\ \cancel{2} & \cancel{9} \\ \cancel{7} & \cancel{4},\ 2 \\ \hline 3 & 8 \end{array}=2\tfrac{2}{3}.$$ *Ans.*

10. $\dfrac{4\frac{3}{4}}{5\frac{7}{8}}=\frac{38}{47}$;

$\dfrac{7\frac{1}{5}}{10\frac{1}{4}}=\frac{144}{205}$.

$\frac{38}{47}\times\frac{144}{205}=\frac{5472}{9635}$. *Ans.*

11.
$$\begin{array}{r|l} 3 & \cancel{16},\ 8 \\ \cancel{12} & 5 \\ \cancel{2} & \cancel{5} \\ \cancel{5} & \cancel{12} \\ \hline 3 & 40=\frac{40}{3},\text{ or }13\frac{1}{3}.\ \textit{Ans.} \end{array}$$

12.
$$\begin{array}{r|l} 8 & 29 \\ 13 & \cancel{2} \\ \cancel{6} & 35 \\ 8 & \cancel{3} \\ \hline 832 & 1015=1\frac{183}{832}.\ \textit{Ans.} \end{array}$$

13.
$$\begin{array}{r|l} 9 & \cancel{20} \\ \cancel{3} & \cancel{5} \\ \cancel{3} & \cancel{16},\ 4 \\ \cancel{5} & 2 \\ \cancel{4} & \cancel{3} \\ \cancel{20} & \cancel{3} \\ \hline 9 & 8=\frac{8}{9}.\ \textit{Ans.} \end{array}$$

14.
$$\begin{array}{r|l} \cancel{4} & 15 \\ 17 & \cancel{6},\ \cancel{3} \\ \cancel{3} & \cancel{8},\ 2 \\ 9,\ \cancel{27} & \cancel{8} \\ \cancel{8} & \cancel{3} \\ \cancel{2} & 7 \\ \hline 153 & 210=1\frac{19}{51}.\ \textit{Ans.} \end{array}$$

15. $\dfrac{15\frac{3}{7}}{63}=\frac{12}{49}$;

$\dfrac{18\frac{1}{2}}{21\frac{2}{3}}=\frac{111}{130}$.

$\frac{12}{49}\times\frac{130}{111}=\frac{520}{1813}$. *Ans.*

16. $\dfrac{18\frac{11}{12}}{17\frac{15}{16}}=\frac{908}{861}$; $\dfrac{\frac{42}{33}}{65}=\frac{14}{715}$

$\frac{908}{861}\times\frac{715}{14}=53\frac{5179}{6027}$. *A*

17. $\dfrac{27\frac{3}{4}}{48\frac{5}{7}}=\frac{777}{1364}$;

$\dfrac{21}{7\frac{5}{8}}=\frac{168}{61}$.

$\frac{777}{1364}\times\frac{61}{168}=\frac{2257}{10912}$.

18. $\dfrac{45\frac{21}{43}}{24\frac{9}{20}}=\frac{39120}{21027}=\frac{80}{43}$;

$\dfrac{39\frac{4}{5}}{43\frac{7}{8}}=\frac{1592}{1755}$.

$\frac{80}{43}\times\frac{1755}{1592}=2\frac{436}{8557}$. *A*

19. $\dfrac{118\frac{2}{3}}{71\frac{1}{5}}=\frac{5}{3}$, or $\frac{40}{24}$;

$\dfrac{50\frac{5}{8}}{45}=\frac{9}{8}$, or $\frac{27}{24}$;

$\frac{40}{24}+\frac{27}{24}=\frac{67}{24}$.

$\dfrac{68\frac{4}{9}}{85\frac{3}{4}}=\frac{2464}{3087}$.

$\frac{67}{24}\times\frac{2464}{3087}=2\frac{302}{1323}$. *A*

20. $\dfrac{83\frac{11}{14}}{95\frac{13}{15}}=\frac{17595}{20132}$;

$\dfrac{7\frac{1}{2}}{12}$ of $\dfrac{5\frac{1}{2}}{7\frac{1}{4}}=\frac{55}{116}$.

$\frac{17595}{20132}\times\frac{116}{55}=1\frac{46688}{55363}$

21. $\dfrac{65\frac{3}{8}}{87\frac{1}{2}}=\frac{523}{700}$;

$\dfrac{46\frac{1}{3}}{140}=\frac{139}{420}$.

$\frac{523}{700}\times\frac{139}{420}=\frac{72697}{294000}$.

$\dfrac{16\frac{3}{4}}{13\frac{2}{5}}=\frac{5}{4}$;

$\frac{72697}{294000}\times\frac{4}{5}=\frac{72697}{367500}$.

22. $\frac{3}{4}$ of $\frac{44\frac{2}{5}}{63\frac{3}{7}}=\frac{21}{40}$, or $\frac{441}{840}$;

$\frac{4}{5}$ of $\frac{17}{25\frac{1}{2}}=\frac{8}{15}$, or $\frac{448}{840}$;

$\frac{1}{3}$ of $\frac{92\frac{4}{7}}{81}=\frac{8}{21}$, or $\frac{320}{840}$.

$\frac{1209}{840}=1\frac{123}{280}$. *Ans.*

23. $\frac{35\frac{1}{2}}{49\frac{2}{3}}=\frac{71}{2}\times\frac{3}{149}$;

$119\frac{1}{5}=\frac{596}{5}$;

$\frac{71}{\cancel{2}}\times\frac{3}{\cancel{149}}\times\frac{\overset{\cancel{4},\,2}{\cancel{596}}}{5}=\frac{426}{5}$.

$\frac{86\frac{5}{7}}{607}=\frac{\cancel{607}}{7}\times\frac{1}{\cancel{607}}=\frac{1}{7}$;

$\frac{48\frac{1}{2}}{57}=\frac{97}{2}\times\frac{1}{57}$;

$\frac{1}{7}$ of $\frac{\cancel{2}}{\cancel{3}}$ of $\frac{\cancel{3}}{4}$ of $\frac{97}{\cancel{2}}\times\frac{1}{57}=$

$\frac{97}{1596}$.

$\frac{426}{5}\times\frac{1596}{97}=1401\frac{411}{485}$

EXERCISES IN FRACTIONS.—(p. 134.)

1.
$45\frac{3}{4}=45\frac{42}{56}$
$63\frac{5}{8}=63\frac{35}{56}$
$56\frac{4}{7}=56\frac{32}{56}$
Ans. $165\frac{53}{56}$ yards.

2.
$85\frac{7}{8}=\ 85\frac{42}{48}$
$95\frac{11}{12}=\ 95\frac{44}{48}$
$115\frac{5}{16}=115\frac{15}{48}$
Ans. $297\frac{5}{48}$ miles.

3. $\frac{7}{12}$ of $\frac{9}{21}$ of $\frac{6}{1}=\ 1\frac{35}{70}$
$75\frac{3}{5}=\ 75\frac{42}{70}$
$163\frac{26}{35}=163\frac{52}{70}$
$185\frac{7}{10}=185\frac{49}{70}$
Ans. $426\frac{19}{35}$.

4.
$69\frac{3}{4}=\ 69\frac{15}{20}$
$\frac{8}{9}$ of $360=320$
$\frac{2}{3}$ of $\frac{3}{4}$ of $\frac{93}{2}=\ 23\frac{5}{20}$
$76\frac{4}{5}=\ 76\frac{16}{20}$
Ans. $489\frac{4}{5}$.

5.
$178\frac{3}{4}=178\frac{15}{20}$
$87\frac{3}{5}=\ 87\frac{12}{20}$
Ans. $91\frac{3}{20}$ A.

6.
$685\frac{7}{8}=685\frac{35}{40}$
$263\frac{4}{5}=263\frac{32}{40}$
Ans. \$$422\frac{3}{40}$.

7. $\frac{2}{3}$ of $\frac{11}{16}=\frac{22}{48}$; $\frac{11}{16}=\frac{33}{48}$.
$\frac{33}{48}-\frac{22}{48}=\frac{11}{48}$ ship. *Ans.*

8. $\frac{3}{4}$ of $675=506\frac{1}{4}$
17
$523\frac{1}{4}$
$675-523\frac{1}{4}=151\frac{3}{4}$ bbls.
Ans.

9. $\frac{703}{4}\times\frac{11}{8}=\frac{7733}{32}$, or
\$$241\frac{21}{32}$. *Ans.*

10. $\frac{394}{5}\times\frac{99}{4}=\frac{39006}{20}$, or
\$$1950\frac{3}{10}$. *Ans.*

11. $5490\frac{3}{8}\times 29=159220\frac{7}{8}$.
Ans.

12. $\frac{5}{\cancel{6}}$ of $\frac{\cancel{7}}{\underset{4}{\cancel{8}}}$ of $\frac{\cancel{6}}{\cancel{7}}$ of $\frac{23}{1}\times\frac{\cancel{2}}{\cancel{3}}$ of
$\frac{\overset{61}{\cancel{183}}}{4}=438\frac{7}{16}$. *Ans.*

13. $\frac{1003}{8}\times\frac{5}{447}=\frac{5015}{3576}$, or $\$1\frac{1439}{3576}$. *Ans.*

14. $\frac{14687}{\cancel{8},\ 2}\times\frac{\cancel{4}}{855}=\frac{14687}{1710}$, or $\$8\frac{1007}{1710}$. *Ans.*

15. $\frac{4505}{8}\times\frac{\cancel{4}}{3}$ of $\frac{\cancel{8}}{7}$ of $\frac{1}{\cancel{32}}=\frac{4505}{168}$
or $26\frac{137}{168}$. *Ans.*

16. $\frac{\cancel{4}}{\cancel{5}}$ of $\frac{\cancel{7}}{\cancel{8},\ 2}$ of $\frac{591}{\cancel{7}}\times\frac{\cancel{5}}{136}=$
$\frac{591}{272}$, or $2\frac{47}{272}$. *Ans.*

17. $156\frac{21}{24}\ (\frac{7}{8})$ $156\frac{21}{24}$
$83\frac{16}{24}\ (\frac{2}{3})$ $83\frac{16}{24}$
$240\frac{13}{24}$ sum. $73\frac{5}{24}$ dif.

18. $\frac{2}{\cancel{3}}$ of $\frac{4}{\cancel{5}}$ of $\frac{\overset{52}{\cancel{156}}}{1}\times\frac{\overset{16}{\cancel{80}}}{7}=\frac{6656}{7}$,
or $950\frac{6}{7}$ prod.
$\frac{\cancel{2}}{\cancel{3}}$ of $\frac{\cancel{4}}{5}$ of $\frac{\overset{\cancel{52},\ 26}{\cancel{156}}}{1}\times\frac{7}{\underset{\cancel{10},\ 5}{\cancel{80}}}=\frac{182}{25}$,
or $7\frac{7}{25}$ quot.

19. $263\frac{25}{45}\ (\frac{5}{9})$ $263\frac{25}{45}$
$75\frac{36}{45}\ (\frac{4}{5})$ $75\frac{36}{45}$
$339\frac{16}{45}$ sum. $187\frac{34}{45}$ dif.
$\frac{2372}{9}\times\frac{379}{5}=\frac{898988}{45}$, or
$19977\frac{23}{45}$ prod.
$\frac{2372}{9}\times\frac{5}{379}=\frac{11860}{3411}$, or
$3\frac{1627}{3411}$ quot.

20. $\frac{283}{8}\times\frac{15}{4}=\frac{4245}{32}$, or $\$132\frac{21}{32}$. *Ans.*

21. $\frac{689}{10}\times\frac{53}{8}=\$456\frac{37}{80}$. *Ans.*

22. $\frac{87}{2}\times\frac{88}{5}=\$765\frac{3}{5}$. *Ans.*

23. $19\frac{3}{5}\times45=\$882$ cows.
$39\frac{5}{8}\times68=\$2694\frac{1}{2}$ oxen.
Ans. $\$3576\frac{1}{2}$.

24. $\frac{\cancel{4}}{5}$ of $\frac{19}{\cancel{20},\ 5}$ of $\frac{157}{2}=\frac{2983}{50}$,
$\frac{1}{7}$ of $\frac{3}{8}$ of $\frac{67}{4}=\frac{201}{224}$.
$\frac{334096}{5600}-\frac{5025}{5600}=$
$58\frac{4271}{5600}$ m. *Ans.*

25. $\frac{175}{2}\times\frac{\cancel{4}}{67}\times\frac{111}{\cancel{4}}=144\frac{129}{134}$. *Ans.*

26. $117\frac{64}{108}\ (\frac{16}{27})$ $117\frac{64}{108}$
$87\frac{99}{108}\ (\frac{11}{12})$ $87\frac{99}{108}$
$205\frac{55}{108}$ sum. $29\frac{73}{108}$ dif.
$\frac{22195}{\cancel{108}}\times\frac{\cancel{108}}{3205}=6\frac{593}{641}$. *Ans.*

27. $91\frac{36}{63}\ (\frac{4}{7})$
$65\frac{14}{63}\ (\frac{2}{9})$
$26\frac{22}{63}$ dif.
$\frac{1660}{63}\times\frac{1282}{21}=1608\frac{736}{1323}$.

28. $\frac{1319}{7}\times\frac{2}{337}=\frac{2638}{2359}$, or $£1\frac{279}{2359}$. *Ans.*

29. $\frac{7344}{5}\times\frac{2}{347}=\frac{14688}{1735}$, or $£8\frac{808}{1735}$. *Ans.*

30. $\frac{\cancel{2}}{\cancel{3}}$ of $\frac{5}{\cancel{8},\ 4}$ of $\frac{75}{\cancel{4}}\times\frac{\cancel{4}}{1}$ of $\frac{11}{7}$ of
$\frac{\cancel{3}}{14}=10\frac{205}{392}$ pears.

31. $185\frac{12}{19}-63=122\frac{12}{19}$ *Ans*

32. $256\frac{57}{75}\ (\frac{19}{25})-116\frac{50}{75}\ (\frac{2}{3})=$
$140\frac{7}{75}$. *Ans.*

33. $56\times\frac{3}{38}=\frac{168}{38}=4\frac{8}{19}$. *Ans*

34. $\frac{113}{2}\times\frac{3}{47}=\frac{339}{94}=3\frac{57}{94}$.

35. $28\frac{3}{5}\times35=1001$. *Ans.*

36. $\frac{\cancel{2}}{\cancel{5}}$ of $\frac{\cancel{5}}{7}$ of $\frac{8}{1}\times\frac{75}{\cancel{2}}=85\frac{5}{7}$. *Ans*

37. $496\div7\frac{3}{4}=64$;
$64-26\frac{3}{5}=37\frac{2}{5}$. *Ans.*

38. $\frac{2}{3}$ of $\frac{387}{4}(96\frac{3}{4})=64\frac{1}{2}$,
$96\frac{3}{4}-64\frac{2}{4}(\frac{1}{2})=32\frac{1}{4}$ rem.
$\frac{3}{4}$ of $\frac{129}{4}=\frac{387}{16}=24\frac{3}{16}$.
$\frac{387}{16}\times\$\frac{5}{4}=\frac{1935}{64}=\$30\frac{15}{64}$;
$32\frac{4}{16}(\frac{1}{4})-24\frac{3}{16}=8\frac{1}{16}$,
$\frac{129}{16}\times\$\frac{7}{8}=\frac{903}{128}$, or $\$7\frac{7}{128}$,
$\$30\frac{30}{128}(\frac{15}{64})+\$7\frac{7}{128}=$
$\$37\frac{37}{128}$. *Ans.*

Or, $32\frac{1}{4}$ yds.=the yds. sold.
$24\frac{3}{16}$ yds.$\times\$\frac{5}{4}=\$30\frac{15}{64}$,
$8\frac{1}{16}$ yds.$\times\$\frac{7}{8}=\quad\underline{\$7\frac{7}{128}}$.
Ans. $\$37\frac{37}{128}$.

39. $\frac{3}{5}$ of $\frac{113}{2}(56\frac{1}{2})=\frac{339}{10}$ or
$33\frac{9}{10}$,

$$\frac{339}{\cancel{10},2}\times\frac{\cancel{85},17}{8}=\frac{5763}{16}=$$

$\$360\frac{3}{16}$,
$56\frac{1}{2}-33\frac{9}{10}=22\frac{6}{10}$,

$$\frac{\overset{113}{\cancel{226}}}{10}\times\frac{39}{\cancel{4},2}=\frac{4407}{20}=$$

$\$220\frac{7}{20}$,
$\$360\frac{15}{80}(\frac{3}{16})+\$220\frac{28}{80}(\frac{7}{20})$
$=\$580\frac{43}{80}$. *Ans.*

40. $\frac{677}{8}\times\frac{23}{4}=\frac{15571}{32}$, or
$\$486\frac{19}{32}$,
$\frac{677}{8}\times\frac{25}{4}=\frac{16925}{32}$, or
$\$528\frac{29}{32}$.
$\$528\frac{29}{32}-\$486\frac{19}{32}=$
$\$42\frac{5}{16}$ gain. *Ans.*

41. $$\frac{863}{\cancel{7}}\times\frac{\overset{5}{\cancel{35}}}{2}\times\frac{5}{228}=\frac{21575}{456},$$
or $47\frac{143}{456}$. *Ans.*

REDUCTION.—(p. 150.)

ART. **162.**

1—5 Given.

6. 4)57600 far.
12)14400d.
2|0)120|0s.
£60. *Ans*

7. £43, 12s.
20
872s. *Ans.*

8. 217s
12
2604d.
4
10416 far. *Ans.*

9. 12)1176d.
2|0)9|8s.
£4, 18s. *Ans*

10 4)12356 far.
12)3089d.
Ans. 257s. 5d.

11. £675
20
13500s.
12
162000d.
4
648000 far. *Ans.*

12. £84, 16s. 7d. 2f. (½d.)
20
1696s.
12
20359d.
4
81438 far. *Ans.*

13. 12)25256d.
2|0)210|4s. 8d. over.
£105, 4s. 8d. *Ans.*

14 4)56237 far.
12)14059d. 1 f. over.
2|0)117|1s. 7d. over.
Ans. £58, 11s. 7d. 1 far.

15. £425, 9s. 7d. 2 far.
20
8509s.
12
102115d.
4
408462 far. *Ans.*

16. 411 lbs. 2 oz. 3 pwts.
12
4934 oz.
20
98683 pwts. *Ans.*

17. 715 oz.
20
14300 pwts.
24
57200
28600
343200 grs. *Ans.*

18. 10 lbs. 5 oz. 6 pwts.
12
125 oz.
20
2506 pwts.
24
60144 grs. *Ans.*

19. 2|0)51|2 pwts.
12)25 oz. 12 pwts. over.
Ans. 2 lbs. 1 oz. 12 pwts.

20. 24)2156 grs.
2|0)8|9 pwts. 20 g. over.
Ans. 4 oz. 9 pwts. 20 g.

21. 24)35210 grs.
2|0)146|7 pwts. 2 g. over.
12)73 oz. 7 pwts. over.
Ans. 6 lbs. 1 oz. 7 p. 2 g.

22. 425 lbs. 3 oz. 5 drs
16
2553
425
6803 oz.
16
40823
6803
108853 drs. *Ans.*

23. 36 cwt. 2 qrs.
4
146 qrs.
25
3650 lbs. *Ans.*

24. 35 T. 7 cwt. 15 lbs.
20
707 cwt.
100
70715 lbs.
16
1131440 oz. *Ans.*

25. 3 qrs. 15 lbs. 10 oz.
25
90 lbs.
16
1450 oz.
16
23200 drs. *Ans.*

26. 16)875 oz.
54 lbs. 11 oz. *Ans.*

27. 25)1565 lbs.
4)62 qrs. 15 lbs. over.
Ans. 15 cwt. 2 qrs. 15 lbs.

28. 16)1728 drs.
16)108 oz.
Ans. 6 lbs. 12 oz.

29. 16)5672 oz.
25)354 lbs. 8 oz. over.
4)14 qrs. 4 lbs. over.
Ans. 3 cwt. 2 q. 4 lbs. 8 oz.

30. 25)15285 lbs.
4)611 qrs. 10 lbs. over
2|0)15|2 cwt. 3 q. over.
Ans. 7 T. 12 c. 3 q. 10 lbs.

31. 16)8526720 drs.
16)532920 oz.
25)33307 lbs. 8 oz. over.
4)1332 q. 7 lbs. over.
Ans. 333 cwt. 7 lbs. 8 oz.

32. 170 lbs.
12
2040 oz.
8
16320 drs. *Ans.*

33. 156 lbs.
12
1872 oz.
8
14976 drs.
3
44928 sc. *Ans.*

34. 3)726 sc.
8)242 drs.
Ans. 30 oz. 2 drs.

35. 8)1260 drs.
12)157 oz. 4 drs. over.
Ans. 13 lbs. 1 oz. 4 drs

36. Given.

37. 45 fur.
40
1800 rods.
16½
10800
1800
900
29700 ft.
12
356400 in. *Ans.*

39. 12)9728 in.
$16\frac{1}{2}$)810 ft. 8 in.
2 2
33)1620
Ans. 49 r $1\frac{1}{2}$ ft. 8 in.

40. $16\frac{1}{2}$)26400 ft.
2 2
33)52800
320)1600 r.
Ans. 5 m.

41. 25 leagues.
3
75 m.
320
1500
225
24000 rods.
$16\frac{1}{2}$
144000
24000
12000
396000 ft.
12
4752000 in. *Ans.*

42. 40 l. 6 fur. 2 in.
3
120 m.
8
966 fur.
40
38640 r.
$16\frac{1}{2}$
637560 ft.
12
7650722 in. *Ans.*

43. 12)750324 in.
$16\frac{1}{2}$)62527 ft.
2 2
33)125054
320)$3789\frac{17}{33}$ r.
Ans. 11 m. $269\frac{17}{33}$ r

44. 320 deg.
$69\frac{1}{2}$
25020 m.
320
8006400 r.
$16\frac{1}{2}$
132105600 ft.
12
1585267200 in. *Ans.*

45. 845 yds.
3
2535 ft.
12
30420 in. *Ans.*

46. 53 Fl. e.
3
159 qrs.
4
636 na. *Ans.*

47. 81 E. e.
5
405 qrs.
4
1620 na. *Ans.*

48. 4)563 qrs.
140 yds. 3 qrs. *Ans.*

49. 4)1824 na.
6)456 qrs.
Ans. 76 F. e.

50. 4)5208 na.
5)1302 qrs.
Ans. 260 E. e. 2 qrs.

51. 1766 sq. r. 19 yds.
$30\frac{1}{4}$
52980
$441\frac{1}{2}$
19
$53440\frac{1}{2}$ sq. yds.
9
$480964\frac{1}{2}$ sq. ft. *Ans.*

52. 56 A. 3 R.
4
227 R.
40
9080 rods.
$272\frac{1}{4}$
2472030 sq. ft. *Ans.*

53. 1275 sq. in.
640
51000
7650
816000 acres. *Ans.*

54. $272\frac{1}{4}$)25640 ft.
4 4
1089)102560
Ans. $94\frac{194}{1089}$ sq. r.

55. 4)1865 roods.
466 A. 1. R. *Ans.*

56. $30\frac{1}{4}$)$2118165\frac{3}{4}$ ($\frac{1}{2}$) yds.
4 4
121)8472662
160)70022 sq. r.
Ans. 437 A. 102 r.

57, 58. Given.

59. 18×17=306 sq. ft. *Ans.*

60. 20 ft.
18
9)360 sq. ft.
40 sq. yds. *Ans.*

61. 36 r.
25
16|0)90|0 sq. r.
Ans. 5 A. 2 R. 20 r.

62. 48
80
16|0)384|0 sq. rods.
24 acres. *Ans.*

63. 75 cu. ft.
1728
129600 cu. in. *Ans*

64. 37 T.
40
1480 cu. ft.
1728
2557440 cu. in. *Ans.*

65. 5|0)2812|4 cu. ft.
Ans. 562 T. 24 cu. ft.

66. 128)16568 cu. ft.
Ans. 129 C. 56 ft.

67. 65×128=8320 cu. ft.
Ans

68. 18 in.
30
540 cu. in.
15
8100 cu. in. Ans.

69
43 in.
18
774
12
9288 cu. in. *Ans.*

70.
16 ft.
15
240
9
2160 cu. ft. *Ans.*

71. 8×4×3½=112 ft. *Ans.*

72.
16 ft.
6
96
5
128)480 cu. ft.
3¾ C. *Ans.*

73.
140 ft.
4½
560
70
630
6½
3780
315
128)4095 cu. ft.
Ans. $31\frac{127}{128}$ C.

74.
4)4624 gi.
2)1156 pts.
4)578 qts.
Ans. 144 gals. 2 qts.

75.
4)24260 qts.
63)6065 gals.
Ans. 96 hhds. 17 gals.

76.
15 hhds. 20 gals.
63
965 gals.
4
3860 qts.
2
7720 pts. *Ans.*

77.
40 bbls. 3 gals. 2
31½
1263 gals.
4
5054 qts.
2
10108 pts.
4
40432 gi. *Ans.*

78.
2)5000 pts.
4)2500 qts.
36)625 gals.
Ans. 17 bbls. 13 g

79.
4)7800 qts.
54)1950 gals.
Ans. 36 hhds. 6 g

80.
25 hhds. 7 gal
54
1357 gals.
4
5428 qts. *Ans.*

81.
110 gals. 3 qts. 1
4
443 qts.
2
887 pts. *Ans.*

82. 536 bu. 3 pks.
4
2147 pks.
8
17176 qts. *Ans.*

83. 821 qrs.
8
6568 bu.
32
210176 qts.
2
420352 pts. *Ans.*

84. 2)6912 pts.
32)3456 qts.
108 bu. *Ans.*

85. 32)85600 qts.
2675 bu. *Ans.*

86. 15 d. 6 hrs. 9 min.
24
366 hrs.
60
21969 min.
60
1318140 sec. *Ans.*

87 365 d. 6 hrs.
24
8766 hrs.
60
525960 min. *Ans.*

88. 365 d. 5 h. 48 m. 48 s.
24
8765 hrs.
60
525948 min.
60
31556928 sec. *Ans.*

89. 365 d. 6 hrs.
24
8766 hrs.
60
525960 min. in 1 yr.
21 yrs.
11045160 min. *Ans.*

90. 6|0)56824|0 sec.
6|0)947|0 m. 40 s. over
Ans. 157 h. 50 m. 40 s.

91. 6|0)856845|6 min.
24)142807 h. 36 m. over
7)5950 d. 7 h. over.
Ans. 850 w. 7 h. 36 m.

92. 24)6925600 hrs.
7)288566 d. 16 h. over.
4)41223 w. 5 d. over.
Ans. 10305 mo. 3 wks. 5 d. 16 hrs.

93. 24)56857200 hrs.
7)2369050 d.
4)338435 w. 5 d. over
13)84608 m. 3 w. over
Ans. 6508 yrs. 4 mo. 3 wks. 5 d.

94. 6|0)100000000|0 sec.
6|0)1666666|6 m. 40 s.
24)277777 h. 46 m.
7)11574 d. 1 h.
4)1653 w. 3 d.
13)413 mo. 1 w.
31 yrs. 10 mo. 1 wk. 3 d. 1 hr. 46 min. 40 sec. *Ans.*

95. 75°
60
4500′
60
270000″ *Ans.*

96. 8 signs, 15°
30
255°
60
15300′ *Ans.*

97. 12 signs.
30
360°
60
21600′
60
1296000″ *Ans.*

98. 6|0)8686|0″
6|0)144|7′ 40″ over.
Ans. 24° 7′ 40″.

99. 6|0)56780|0′
3|0)946|3° 20′ over.
Ans. 315 s. 13° 20′.

100. 3|0)2500000|0″
6|0)41666|6′ 40″ over
3|0)694|4° 26′ over.
Ans. 231 s. 14° 26′ 40″

101. 25×12=300;
300×9d.=£11, 5s. *Ans.*

102. 29 g. 6s.=615s.
615s÷15=41s. *Ans.*

103. $5\frac{1}{2}$ g.×12×21=1386.
1386s.÷22=63 sheep.

104. 2 cwt. $17\frac{1}{2}$ lbs.=$217\frac{1}{2}$ lbs.
$217\frac{1}{2}$lbs.×7d.=$1522\frac{1}{2}$d.
$1522\frac{1}{2}$d=£6, 6s. $10\frac{1}{2}$d.
Ans.

105. 1 T. 17 cwt.=37 cwt.
37 cwt.×\$$1\frac{1}{2}$=\$$55\frac{1}{2}$.
Ans.

106. 7 lbs. $8\frac{1}{2}$ oz.=185 oz.
185÷$2\frac{1}{2}$=37 spoons.
37×\$$\frac{7}{8}$=\$$32\frac{3}{8}$. *Ans.*

107. 50 lbs. 9 oz.=292320 g.
292320÷$412\frac{1}{2}$=\$$708\frac{36}{55}$
Ans.

108. 100 lbs. 10oz.=580800g.
580800÷258=$2251\frac{7}{43}$
$2251\frac{7}{43}$×2=$4502\frac{14}{43}$
$2251\frac{7}{43}$÷2=$1125\frac{25}{43}$

109. 5 m. 6 fur. 23 r. 5 yds.
8 in.=369062 in. *Ans.*
Proof. 5 m. 6 fur. 23 r
$4\frac{1}{2}$ yds. 2 ft. 2 in.
For, $4\frac{1}{2}$ yds.+2 ft.+2 in.
=5 yds.+8 in.

110. 8 m. 5 fur. 25 r. 3 yds.
8 in.=551546 in. *Ans.*
Proof. 8 m. 5 fur. 25 r
$2\frac{1}{2}$ yds. 2 ft. 2 in.
For, $2\frac{1}{2}$ yds.+2 ft.+2 in.
=3 yds.+8 in.

111. 4 A. 2 R. 15 r.=735 r.
735 r.×\$$2\frac{1}{2}$=\$$1837\frac{1}{2}$.
Ans

112. 6 w. 4 d. 5 h.=24300 m.
24300×65=1579500.
Ans.

113. 253 d. 16 h.=365280 m.
365280×65=23743200 times.

114. 13 T. 9 cwt. 2 qrs. 18 lbs.
=26968 lbs.
26968 lbs.÷56=481$\frac{4}{7}$
firkins. *Ans.*

115 5 hhds. 1 bbl. 16 gals.=
2900 pts.
2900÷3=966$\frac{2}{3}$ bottles.

116. 22×18=396 sq. ft.
396÷9=44 yds. *Ans.*

117. 66 ft.=4 rods.
Now 865 r.×4 r.=
3460 sq. r.
3460÷160=21$\frac{5}{8}$ A.
Ans.

118. (18 ft.+17$\frac{1}{2}$ ft.)×2=
71 ft.
71 ft.×14$\frac{1}{2}$=1029$\frac{1}{2}$ s. ft.
1029$\frac{1}{2}$÷9=114$\frac{7}{18}$ s. y.

119. 18×18=324 sq. ft. ceil.
72×15=1080 sq. ft.
in 4 sides,
324+1080=1404 sq.ft.
1404÷9=156 sq. yds.
Ans.

120. $\frac{36}{1}\times\frac{\cancel{3}}{\cancel{2}}\times\frac{\overset{2}{\cancel{4}}}{\cancel{3}}(\frac{3}{4})$=72 yds.

121. $\frac{\overset{17}{\cancel{51}}}{1}\times\frac{5}{\cancel{4}}\times\frac{\cancel{4}}{\cancel{3}}$=85 yds.

122. 3 m. 115 r.=1075 r.
1075 r.×2=2150 sq. r.
2150×15\frac{1}{2}$=$33325.
Ans.

123. 15 A. 60 r.=2460 r.
2460÷12=205 lots.
205×$350=$71750.
Ans.

124. 18 ft.×10$\frac{1}{2}$×9$\frac{1}{2}$=
1795$\frac{1}{2}$ cu. ft.
1795$\frac{1}{2}$ cu. ft.÷128=
14$\frac{7}{256}$ C.
14$\frac{7}{256}$×3\frac{1}{2}$=$49$\frac{49}{512}$.

125. 1500 m.=7920000 ft.
7920000÷9=880000
times. *Ans.*

126. 240000÷8=30000min.
30000m.=2 wks. 6 d.
20 hrs. *Ans.*

127. 11875000×8=
95000000 miles.
95000000÷30=
18849 w. 1 d. 10$\frac{2}{3}$ h.

128. 75×8×144=
86400 sq. in.
8×4=32 sq. in.
86400÷32=2700 b'ks

129. 648 yds.×4=2592 qrs
2592÷18 qrs. (4 y. 2 q.)
=144 suits. *Ans.*

130. 50×40×144=
288000 sq. in.
288000÷24=12000
shingles. *Ans.*

131. 6×6=36 sq. m.=
23040 A.
23040÷160=144
farms. *Ans.*

132. 60×48×2=5760 cu.ft.
23×48×2=2208 "
4 walls =7968 "
7968×1728=
13768704 cu. in.
8×4×2=64 cu. in. in
1 brick.
64)13768704
Ans. 215136 bricks.

FRACTIONAL COMPOUND NUMBERS.—(p. 157.)

ART. 164.

1, 2. Given.

3. 9d. 3 far.=39 far.
1s.×12×4=48 far.
$\frac{39}{48}=\frac{13}{16}$s. *Ans.*

4. 3 pks. 5 qts.=29 qts.
1 bu.=32 qts.
$\frac{29}{32}$ bu. *Ans.*

5. 5 qts. 1 pt.=11 pts.
1 pk.=16 pts.
$\frac{11}{16}$ pk *Ans.*

6. 3 qts. 1 pt. 3 gi.=31 gi.
1 gal.=32 gi.
$\frac{31}{32}$ gal. *Ans.*

7. 1 pt. 1 gi.=5 gi.
1 gal.=32 gi.
$\frac{5}{32}$ gal. *Ans.*

8. 15 gals. 3 qts.=63 qts.
1 hhd.=252 qts.
$\frac{63}{252}$ hhd.=$\frac{1}{4}$ hhd. *Ans.*

9. 5 cwt. 2 qrs.=22 qrs.
1 T.=80 qrs.
$\frac{22}{80}=\frac{11}{40}$ T. *Ans.*

10. 2 qrs. 7 lbs.=57 lbs.
1 cwt.=100 lbs.
$\frac{57}{100}$ cwt. *Ans.*

11. 1 lb. 5 oz.=21 oz.
1 qr.=400 oz.
$\frac{21}{400}$ qr. *Ans.*

12. 45 r. 2 yds. 2 ft.=
1501 half ft.
1 mile=10560 half ft.
$\frac{1501}{10560}$ m. *Ans.*

13. 10 fur. 35 r.=435 r.
1 m.=320 r.
$\frac{435}{320}=\frac{87}{64}$ m. *Ans.*

14. 2 m. 1 fur. 1 r.=681 r
1 lea.=960 r.
$\frac{681}{960}=\frac{227}{320}$ lea. *Ans.*

15. 2 qrs. 3 na.=11 na.
1 yd.=16 na.
$\frac{11}{16}$ yd. *Ans.*

19. $2\frac{1}{2}$ hrs.=5 half hrs.
1 d.=48 half hrs.
$\frac{5}{48}$ d. *Ans.*

20. 4 hrs. $8\frac{1}{2}$ min.=497 hf. r
1 d.=2880 half min.
$\frac{497}{2880}$ d. *Ans.*

21. 3 min. 40 sec.=220 se
1 hr.=3600 sec.
$\frac{220}{3600}=\frac{11}{180}$ hr. *Ans.*

22. 1 hr. $15\frac{3}{4}$ sec.=14463
fourths sec.
1 wk.=2419200, 4ths. se
$\frac{14463}{2419200}=\frac{1607}{268800}$ wk.

23. 1 lb. $5\frac{3}{4}$ oz.=87 fourths c
1 cwt.=6400 fourths o
$\frac{87}{6400}$ cwt. *Ans.*

24. $\frac{5}{8}$ lb.=5 eighths lb.
1 T.=16000 eighths lb
$\frac{5}{16000}=\frac{1}{3200}$ T. *Ans.*

25. $15\frac{3}{8}$ gal.=123 eighths
1 hhd.=504 eighths g
$\frac{123}{504}=\frac{41}{168}$ hhd. *Ans.*

26. 3 qts. 1 pt. $3\frac{2}{5}$ gi.=
157 fifths gi.
1 gal.=160 fifths gi.
$\frac{157}{160}$ gal. *Ans.*

27. 11 d. 3 hr. 14 min.=
16034 min.
30 d.=43200 min.
$\frac{16034}{43200}=\frac{8017}{21600}$. *Ans.*

28. 1 T. 11 cwt. 16 lbs.=
3116 lbs.
5 T.=10000 lbs.
$\frac{3116}{10000}=\frac{779}{2500}$. *Ans.*

29. $4\times4=16$ sq. yd.
$\frac{4}{16}=\frac{1}{4}$. *Ans.*

30. $\frac{1}{6}$ of 144 sq. in.=24 sq. in.
$\frac{1}{6}$ of $9\times144=216$ sq. in.
Then $\frac{24}{216}=\frac{1}{9}$. *Ans.*
Or, $\frac{1}{\cancel{6}}\times9\times\cancel{6}=9$ denom.
Then $\frac{1}{9}$. *Ans.*

31. 4 cu. yds=108 cu. ft.
$\frac{4}{108}=\frac{1}{27}$. *Ans.*

32. $\frac{1}{6}$ of 1728 cu. in.=
288 cu. in.
$\frac{1}{6}$ of $27\times1728=7776$ c. in.
Then $\frac{288}{7776}=\frac{1}{27}$. *Ans.*
Or, $\frac{1}{\cancel{6}}\times27\times\cancel{6}=27$ denom.
Then $\frac{1}{27}$. *Ans.*

33. £5, 6s. 7d.=1279d.
£17, 15s. 8d.=4268d.
$\frac{1279}{4268}$. *Ans.*

34. 1 T. 7 cwt. 19 lbs.=
2719 lbs.
3 T. 5 cwt. 16 lbs.=
6516 lbs.
$\frac{2719}{6516}$. *Ans.*

35. 19 gals. 2 qts. $1\frac{1}{2}$ pt.=
315 half pts.
43 gals. 3 qts.=700 hf. pts.
$\frac{315}{700}=\frac{9}{20}$. *Ans.*

ART. **165.** (p. 159.)

3. £1
20
8)20s.
2s. and 4 rem.
12
8)48d.
6d.
Ans. £$\frac{1}{8}$=2s. 6d.

4. £5
20
7)100s.
14s. and 2 rem.
12
7)24d.
3d. and 3 rem.
£$\frac{5}{7}$=14s. $3\frac{3}{7}$d. *Ans.*

5. 4 wk.
7
5)28 d.
5 d. and 3 rem.
24
5)72 hrs.
14 h. and 2 r.
60
5)120 m.
24 m.
Ans. 5 d. 14 hrs. 24 min

6. 7 d.
24
18)168 hrs.
9 hrs. and 6 rem.
60
18)360 min.
20 min.
Ans. $\frac{7}{18}$ d.=9 hrs. 20 min

7. 2 leagues.
3
5)6 m.
1 m. and 1 rem.
8
5)8 fur.
1 fur., 3 rem.
40
5)120 r.
24 r.
Ans. $\frac{3}{5}$ l.=1 m. 1 fur. 24 r.

8. 4 m.
8
9)32 fur.
3 fur. and 5 rem.
40
9)200 r.
22 r., 2 rem.
Ans. $\frac{4}{9}$m.=3 fur. 22$\frac{2}{9}$ r.

9. 7 cwt.
4
16)28 qrs.
1 qr., 12 rem.
25
16)300 lbs.
18 lbs., 12 rem.
16
16)192 oz.
12 oz.
Ans. 1 qr. 18 lbs. 12 oz.

10. 3 T.
20
7)60 cwt.
8 cwt., 4 rem.
4
7)16 qrs.
2 qrs., 2 rem.
25
7)50 lbs.
7 lbs., 1 r.
Ans. 8 cwt. 2 qrs. 7$\frac{1}{7}$ ll

11. 2 bu.
4
3)8 pks.
2 pks., 2 rem.
8
3)16 qts.
5 qts., 1 rem
Ans. $\frac{2}{3}$ bu.=2 pks. 5$\frac{1}{3}$

12. 3 m.
640
7)1920 a.
274 a., 2 rem.
160
7)320 r
45 r., 5 rem
30$\frac{1}{4}$
7)151$\frac{1}{4}$ y
21 y.,
$\frac{17}{28}$ yd. × 9 = $\frac{153}{28}$ ft. or 5
274 A. 45 r. 21 yds. 5

13. 5 C.
128
8)640 cu. ft.
80 cu. ft.
Ans. $\frac{1}{8}$ C.=80 cu.

14. Given.

ART. **166.** (p. 160.)

15. Given.

16. 7 weeks.
7
49 ds.
$\frac{49}{186}$ d. *Ans.*

17. 4 miles.
320
1280 r.
$\frac{1280}{1184}$, or $\frac{40}{37}$. r. *Ans.*

18. 2 rods.
$16\frac{1}{2}$
33 ft.
$\frac{33}{100}$ ft. *Ans.*

19. 10 yds.
4
40 qrs.
4
160 na.
$\frac{160}{1787}$ na. *Ans.*

20. 1 T.
20
20 cwt.
100
2000 lbs
$\frac{2000}{100000}$, or $\frac{1}{50}$ lb. *Ans.*

21. 2 days.
24
48 hrs.
60
2880 min.
60
172800 sec.
$\frac{172800}{179200}$, or $\frac{27}{28}$ sec. *Ans.*

22. 4 bushels.
32
128 qts.
2
256 pts.
$\frac{256}{2565}$ pt. *Ans*

23. 3 A.
160
480 r.
$272\frac{1}{4}$
130680 sq. ft.
$\frac{130680}{174240}=\frac{3}{4}$ sq. ft. *Ans.*

24. 4 C.
128
512 cu. ft.
$\frac{512}{1152}$, or $\frac{4}{9}$ cu. ft. *Ans.*

ART. **167.** (p. 161.)

1, 2. Given.

3. $\frac{\cancel{5}}{7\times4\times12\times\cancel{20}}$, 4 $=$
£$\frac{1}{1344}$. *Ans.*

4. $\frac{\cancel{3}}{4\times24\times20\times\cancel{12}}$, 4 $=$
$\frac{1}{7680}$ lb. *Ans.*

5. $\frac{\cancel{5}}{8\times16\times\cancel{2000}}=\frac{1}{51200}$ T. *Ans.*
400

6. $\frac{\cancel{8}}{11\times16\frac{1}{2}\times\cancel{320}}=\frac{1}{7260}$ m. *Ans.*
40

7. $\frac{\cancel{4}}{5\times272\frac{1}{4}\times\cancel{160}}=\frac{1}{54450}$ A. *Ans.*
40

8. $\frac{1}{12}\times\frac{1}{11}=\frac{1}{132}$. C. *Ans.*

9 $\frac{\cancel{4}}{5\times2\times\cancel{4}\times63}=\frac{1}{630}$ hhd. *Ans.*

10. $\frac{1}{2}$ sq. yd.$=4\frac{1}{2}$ sq. ft.
2 sq. yds.$=18$ sq. ft
$\frac{4\frac{1}{2}}{18}=\frac{9}{36}$, or $\frac{1}{4}$. *Ans.*
Or, $\frac{1}{2\times2}=$’. *Ans.*

11. $\frac{1}{2}$ yd. sq.$=18$ in.$\times18$,
$\frac{1}{2}$ sq. yd.$=18$ in.$\times36$;
Then $\frac{\cancel{18}\times\cancel{18}}{2,\cancel{36}\times\cancel{18}}=\frac{1}{2}$. *Ans.*

Or, $\frac{1}{2}\times\frac{1}{2}=\frac{1}{4}$, and $\frac{1}{4}\div\frac{1}{2}$
$=\frac{1}{2}$. *Ans.*

COMPOUND ADDITION.—(p. 162.)

ART. 168.

1, 2. Given.
3. £19, 9s. 5d. 3 far.
4. £53, 5s. 5d.
5. £58, 18s. 4d.
6. 45 lbs. 4 oz. 2 p. 10 g.
7. 3 lbs. 7 oz. 12 p.
8. 61 lbs. 7 oz. 9 p.
9. 19 lbs. 11 oz. 5 p. 23 g.
10. £70, 17s. 9d.
11. 15 cwt. 33 lbs. 9 oz.
12. 1267 lbs. 13 oz.
13. 10 T. 178 lbs. 12 oz.
14. 28 yds. 3 qrs. 1 n.
15. 118 yds. 3 qrs. 2 n.
16. 65 bu. 1 pk.
17. 92 bu. 3 pks. 2 qts.
18. 99 m. 5 fur. 11 r.
19. 6 hhds. 53 gals. 3 qts.
20. 8 p. 59 gals. 2 qts. 1 pt.
21. 109 yds. 8 ft. 142 in.
22. 31 acres, 61 r. 48 ft.
23. 99 cu. ft. 227 in.
24. 73 C. 69 ft. 177 in.
25. 87 lbs. 6 oz. 7 drs. 2 sc 9 grs.
26. 177 m. $7\frac{3}{4}$ fur. 35 r. 3 yds. 0 ft. 10 in.
27. 64 l. 0 m. $7\frac{1}{4}$ fur. 27 r. 8 ft.
28. 200 yrs. 11 mos. 0 wk. 4 ds.
29. 353 A. 52 sq. r. $10\frac{1}{2}$ sq. yds $3\frac{3}{4}$ ft.
30. 30 c. 9 s. 20° 9′ 16″.

ADDITION OF FRACTIONAL COMPOUND NUMBERS.

ART. 168. *a.* (p. 165.)

1, 2. Given.

3. $\frac{5}{8}$ lb.$=$7 oz. 10 pwts. 0 g.
$\frac{2}{3}$ oz.$=$0 oz. 13 pwts. 8 g.
$\frac{3}{5}$ pt.$=$0 oz. 0 pwt. $14\frac{2}{5}$ g
Ans. 8 oz. 3 pwts. $22\frac{2}{5}$ g

4. $\frac{1}{6}$ oz.$=$3 pwts. 8 grs.
$\frac{3}{10}$ pwt.$=$0 pwt. $7\frac{1}{5}$ grs.
$\frac{3}{8}$ gr.$=$0 pwt. $0\frac{3}{8}$ gr.
Ans. 3 pwts. $15\frac{23}{40}$ gr.

5. $\frac{3}{5}$ T.=12 cwt.
$\frac{3}{4}$ cwt.= 0 c. 75 lb.
$\frac{1}{2}$ lb.= 0 c. 0 lb. 8 oz.
Ans. 12 c. 75 lb. 8 oz.

6. $\frac{3}{7}$ c.=42 lb. 13 oz. $11\frac{3}{7}$ d.
$\frac{2}{3}$ lb.= 0 lb. 10 oz. $10\frac{2}{3}$ d.
$\frac{1}{4}$ oz.= 0 lb. 0 oz. 4 d.
Ans. 43 lb. 8 oz. $10\frac{2}{21}$.

7. $\frac{2}{3}$ m.=5 f. 13 r. $5\frac{1}{2}$ ft.
$\frac{1}{2}$ of $5\frac{1}{3}$ f.=2 f. 26 r. 11 ft.
Ans. 1 m. 0 f. 0 r. 0 ft.

8. $7\frac{3}{4}$ in.=0 r. 0 ft. $7\frac{3}{4}$ in.
$2\frac{2}{3}$ ft.=0 r. 2 ft. 8 in.
$6\frac{5}{11}$ r.=6 r. 7 ft. 6 in.
Ans. 6 r. 10 ft. $9\frac{3}{4}$ in.

9. $\frac{3}{8}$ yd.=1 qr. 2 na. 0 in.
$\frac{1}{4}$ na.=0 qr. 0 na. $\frac{9}{16}$ in.
$\frac{7}{8}$ in.=0 qr. 0 na. $\frac{7}{8}$ in.
Ans. 1 qr. 2 na. $1\frac{7}{16}$ in.

10. $\frac{3}{4}$ in.=0 qr. 0 na. $\frac{3}{4}$ in.
$\frac{5}{7}$ na.=0 qr. 0 na. $1\frac{17}{28}$ in.
$\frac{5}{9}$ yd.=2 qr. 0 na. 2 in.
Ans. 2 qr. 1 na. $2\frac{3}{28}$ in.

11. $\frac{3}{5}$ A.=2 R. 16 r. 0 ft.
$\frac{5}{8}$ R.=0 R. 25 r. 0 ft.
$\frac{7}{12}$ r. =0 R. 0 r. $158\frac{13}{16}$ft.
Ans. 3 R. 1 r. $158\frac{13}{16}$ft.

12. $\frac{7}{12}$ sq. r.=17 y. 5 ft. 117.
$\frac{2}{9}$ sq. y.= 0 y. 2 ft. 0.
$\frac{5}{7}$ sq. ft. = 0 y. 0 ft. $102\frac{6}{7}$.
Ans. 17 y. 8 ft. $75\frac{6}{7}$.

13. $4\frac{3}{5}$ C.=4 C. 76 ft. $1382\frac{2}{5}$.
$\frac{7}{8}$ ft.=0 C. 0 ft. 1512.
Ans. 4 C. 77 ft. $1166\frac{2}{5}$

14. $\frac{5}{9}$ yd.=15 ft. 0 in.
$2\frac{11}{12}$ ft.= 2 ft. 1584 in.
Ans. 17 ft. 1584 in.

15. $\frac{1}{7}$ hhd.=9 g. 0 qt. 0 pt.
$3\frac{3}{4}$ gals.=3 g. 3 qt. 0 pt.
$1\frac{1}{2}$ qt.=0 g. 1 qt. 1 pt.
$\frac{1}{9}$ hhd.=7 g. 0 qt. 0 pt.
$\frac{1}{2}$ of $6\frac{2}{3}$ g.=3 g. 1 qt. $0\frac{2}{3}$ pt.
Ans. 23 g. 1 qt. $1\frac{2}{3}$ pt.

16. $\frac{5}{8}$ bu.=2 pks. 4 qts. 0 pt.
$\frac{11}{16}$ pk.=0 pk. 5 qts. 1 pt.
$\frac{3}{8}$ qt. =0 pk. 0 qt. $0\frac{3}{4}$p.
$\frac{1}{4}$ pt. =0 pk. 0 qt. $0\frac{1}{4}$p.
$\frac{7}{12}$ bu.=2 pks. 2 qts. $1\frac{1}{3}$p.
$\frac{1}{2}$ pk.=0 pk. 4 qts. 0 pt.
$\frac{2}{3}$ qt. =0 pk. 0 qt. $1\frac{1}{3}$p.
$\frac{1}{4}$ pt. =0 pk. 0 qt. $0\frac{1}{4}$p.
Ans. 1 bu. 2 pks. 1 qt. $\frac{11}{12}$pt.

17. $\frac{7}{18}$ d.=9 hrs. 20 m. 0 s.
$\frac{2}{7}$ hr.=0 hr. 17 m. $8\frac{4}{7}$ s.
$\frac{19}{75}$ m.=0 hr. 0 m. $15\frac{1}{5}$ s.
$\frac{42}{20}$ s.=0 hr. 0 m. $2\frac{1}{10}$s.
Ans. 9 hrs. 37 m. $25\frac{61}{70}$s.

18. $\frac{5}{8}$ yd.=0 yd. 2 qrs. 2 na.
$\frac{1}{2}$ qr. =0 yd. 0 qr. 2 na.
$\frac{3}{4}$ na.=0 yd. 0 qr. $0\frac{3}{4}$ na.
$\frac{3}{4}$ yd.=0 yd. 3 qrs. 0 na.
$\frac{5}{8}$ qr.=0 yd. 0 qr. $2\frac{1}{2}$ na.
$\frac{1}{2}$ na.=0 yd. 0 qr. $0\frac{1}{2}$ na.
Ans. 1 yd. 2 qrs. $3\frac{3}{4}$ na.

19. $\frac{3}{4}$ T.=1500 lbs.
$2\frac{1}{2}$ qrs.= $62\frac{1}{2}$ lbs.
$17\frac{3}{4}$ lbs.= $17\frac{3}{4}$ lbs.
Ans. $1580\frac{1}{4}$ lbs.

COMPOUND SUBTRACTION.—(p. 166.)

Art. 169.

1, 2. Given.
3. £8, 7s. 11d. 2 far.
4. £36, 3s. 7d. 2 far.
5. 8 T. 5 cwt. 2 qr. 5 lbs.
6. 28 T. 17 cwt. 3 qr. 8 lbs.
7. 9 gals. 1 qt. 3 gi.
8. 58 hhds. 6 gals. 2 qts.
9. 6 oz. 18 pwt. 2 grs.
10. 13 yds. 1 qr. 3 na.
11. 3 yds. 2 qrs. 2 na.
12. 9 m. 18 r. 7 ft. 10 in.
13. 54 A. 149 r. 38 sq. ft.
14. 70 A. 0 R. 33 r.
15. 128 cu. ft. 1652 cu. in.
16. 48 C. 106 ft. 58 in.
17. 8 yrs. 2 mo. 5 ds. 16 hrs. 15 min.

Art. 170. (p. 168.)

19. 6 yrs. 4 mo. 25 ds.
20. 69 yrs. 1 mo. 21 ds.
21. 3 yrs. 2 mo. 23 ds.
22. 3 yrs. 7 mo. 20 ds.
23. 118 m. 4 fur. 34 r. $13\frac{1}{2}$ ft. 10 in.
24. 96° $61\frac{1}{2}$ m. 224 r. $3\frac{1}{2}$ yds. 2 ft.
25. 162 A. 115 r. $19\frac{1}{4}$ yds. 7 ft. 95 in.
26. 191 A. 2 R. 22 r. $87\frac{1}{4}$ ft.

SUBTRACTION OF FRACTIONAL COMPOUND NUMBERS

Art. 170. *a.* (p. 169.)

1, 2. Given.

3. $\frac{7}{8}$s.$=$10d. 2 far.
$\frac{1}{4}$d.$=$ 0d. 1 far.
10d. 1 far. *Ans.*

4. $\frac{2}{3}$s.$=$8d. 0 far.
$1\frac{1}{4}$d.$=$1d. 1 far.
6d. 3 far. *Ans.*

5. $\frac{5}{7}$ T.$=$14 cwt. 28 lbs. $9\frac{1}{7}$.
$\frac{7}{15}$ c.$=$ 0 cwt. 46 lbs. $10\frac{2}{3}$.
Ans. 13 cwt. 81 lbs. $14\frac{10}{21}$.

6. $\frac{8}{9}$ cwt.$=$88 lbs. $14\frac{2}{9}$ oz.
$\frac{3}{5}$ oz.$=$ 0 lb. $0\frac{3}{5}$ oz.
Ans. 88 lbs. $13\frac{28}{45}$ oz.

7. $\frac{5}{8}$ m.$=$200 r. 0 ft.
$\frac{6}{7}$ r.$=$ 0 r. $14\frac{1}{7}$ ft.
Ans. 199 r. $1\frac{5}{14}$ ft.

8. $\frac{3}{11}$ yd.$=$0 ft. $9\frac{9}{11}$ in.
$\frac{4}{7}$ ft.$=$0 ft. $6\frac{6}{7}$ in.
Ans. $2\frac{74}{77}$ in.

9. $\frac{9}{16}$ A.$=$3 R. 24 r.
$\frac{3}{20}$ r.$=$0 R. $0\frac{1}{16}$ r.
Ans. 3 R. $23\frac{9}{16}$ r.

10. $\frac{3}{5}$ sq. r.$\times 272\frac{1}{4}=163\frac{7}{20}$ ft.
$\frac{2}{3}$ sq. yd$\times 9=$ 6 sq. ft.
Ans. $157\frac{7}{20}$ sq. ft.

11. $\frac{3}{5}$ C.$=$76 ft. $1382\frac{2}{5}$ cu. in.
$\frac{19}{20}$ ft.$=$ 0 ft. $1641\frac{3}{5}$ cu. in.
Ans. 75 ft. $1468\frac{4}{5}$ cu. in.

12. $\frac{11}{12}$ yd $=$24 ft. 1296 cu.in.
$\frac{25}{40}$ in.$=$ 0 ft. $0\frac{5}{8}$ c.in.
Ans. 24 ft. $1295\frac{3}{8}$ c.in.

13. $\frac{16}{23}$ hhd.$=$43 g. $3\frac{7}{23}$ qts.
$\frac{17}{34}$ gal.$=$ 0 g. 2 qts.
Ans. 43 g. $1\frac{7}{23}$ qts.

14. $\frac{7}{8}$ gal.$=$3 qts. 1 pt.
$\frac{2}{3}$ pt.$=$0 qt. $0\frac{2}{3}$ pt.
Ans. 3 qts. $0\frac{1}{3}$ pt.

15. $\frac{7}{15}$ hhd.$=$29 g. 1 qt. $1\frac{1}{5}$pt.
$3\frac{1}{2}$ gals.$=$ 3 g. 2 qt. 0 pt.
Ans. 25 g. 3 qt. $1\frac{1}{5}$pt.

16. $\frac{3}{4}$ of $\frac{5}{8}$T.$=\frac{15}{32}$T.$=937\frac{1}{2}$ lbs.
$12\frac{3}{5}$ lbs.$=$ $12\frac{3}{5}$ lbs.
Ans. $924\frac{9}{10}$ lb.

17. $\frac{7}{10}$ wk.$=$4 d. 21 h. 36 m.
1 d. $2\frac{1}{2}$ h.$=$1 d. 2 h. 30 m.
Ans. 3 d. 19 h. 6 m.

18. $27\frac{1}{4}$ yds. $2\frac{1}{2}$ qrs. $2\frac{1}{3}$ na.$=$
27 yds. 3 qrs. $4\frac{1}{3}$ na.
$16\frac{3}{4}$ yds. $1\frac{1}{2}$ na.$=$16 yds
3 qrs. $1\frac{1}{2}$ na.
Ans. 11 yds. $2\frac{5}{6}$ na

19. $45\frac{1}{2}$ A. $39\frac{1}{4}$ r.
$19\frac{1}{4}$ A. $13\frac{1}{5}$ r.
$26\frac{1}{4}$ A. $26\frac{1}{20}$ r. *Ans.*

20. $51\frac{1}{4}$ gals. $2\frac{1}{2}$ qts. $1\frac{1}{4}$pt.$=$
52 gals. 1 gi.
1 hhd.$=$63 g. 0 qt. 0 pt. 0 gi.
52 g. 0 qt. 0 pt. 1 gi.
Ans. 10 g. 3 qt. 1 pt. 3 gi.

COMPOUND MULTIPLICATION.—(p. 170.)

ART. 171.

1, 2. Given.
3. £127, 12s. 6d.
4. £187, 14s.
5. £8, 9s. 3d. 3 far.
6. £56, 6s. 3d.
7. £44, 4s.
8. 7670 d. 2 h. 4 m. 48 sec.
9. 3 lbs. 1 oz. 14 pwt. 4 gr.
10. 5 lbs. 2 oz. 8 pwt.
11. 8 T. 7 cwt. 9 lbs.
12. 5 T. 18 cwt. 2 qrs. 2 lbs. 8 oz.
13. 101 cwt. 15 lbs. 7 oz.
14. 604 gals. 1 qt. 2 gi.
15. 53 miles, 3 fur. 20 r.
16. 319 m. 1 f. 30 r.
17. 328 yds. 2 qrs.
18. 96 a. 90 sq. r.
19. 693 sq. yds.
20. 18 C. 111 ft.
21. 1512 ft. 1064 in.
22. 48° 23′ 20″.
23. 1814° 29′ 52″.
24. 807 gals.
25. 2452 gals. 2 qts.
26. £391, 14s. 5d.
27. 3365 bu. 2 p. 4 qts.
28. 4937 yds. 2 qrs.
29. 35309 T. 2 cwt. 74 lbs.
30. 4687 bu. 2 pks.

COMPOUND DIVISION.—(p. 172.)

ART. 174.

4. £2, 9s. 4d. $2\frac{2}{3}$ far.
5. £5, 18s. 5d. $1\frac{5}{6}$ far.
6. £5, 7s. 1d. $3\frac{3}{4}$ far.
7. £4, 15s. 4d.
8. £6, 5s. 3d. $1\frac{1}{5}$ far.
9. £2, 2s. 6d. $2\frac{1}{12}$ far.
10. 5 oz. 8 pwt. 8 grs.
11. 1 lb. 3 oz. 13 pwt. $9\frac{3}{4}$ g.
12. 10 lbs. $11\frac{1}{2}$ oz.
13. 9 lbs. $8\frac{4}{5}$ oz.
14. 9 yds. 2 qr. $1\frac{3}{8}$ na.
15. 4 m. 4 f. $17\frac{5}{11}$ r.
16. 19 bu. 2 qts.
17. 2 a. $36\frac{29}{36}$ r.
18. 15 bu. $7\frac{5}{9}$ qts.
19. £1, 1s. $3\frac{76}{81}$ far.

APPLICATIONS OF THE COMPOUND RULES.

ART. 175. (p. 174.)

LONDON, Aug. 27th, 1852.

1. *John Porter, Esq.,*

Bought of H. Packard & Co.

20 Bibles, gilt,	at	16s. $8\frac{1}{2}$d.,	£16, 14s. 2d.
12 " extra gilt,	"	18s. 9d.,	£11, 5s.
8 Paradise Lost,	"	9s. $6\frac{1}{4}$d.,	£ 3, 16s. 2d.
18 Homer, 2 vols.	"	12s. 8d.,	£11, 8s.
6 Virgil, 2 vols.	"	13s. $3\frac{3}{4}$d.,	£ 3, 19s. $10\frac{1}{2}$d
			£47, 3s. $2\frac{1}{2}$d.

Received Payment, H. PACKARD & Co.

NEW YORK, Jan. 3d, 1853.

2. *William Hall & Co.,*

To J. C. Carter, Dr.

For 20 pieces silk,	at	£5, 7s. $6\frac{1}{4}$d.,	£107, 10s. 5d.
" 7 " "	"	£7, 3s. $8\frac{3}{4}$d.,	£ 50, 6s. $1\frac{1}{4}$d.
" 8 " linen,	"	£3, 17s. 5d.,	£ 30, 19s. 4d.
" 16 " merino,	"	£4, 10s. $9\frac{1}{2}$d.,	£ 72, 12s. 8d.
" 14 " velvet,	"	£9, 18s. $7\frac{2}{3}$d.,	£139, 0s. $11\frac{1}{3}$d.
			£400, 9s. $5\frac{7}{12}$d.

Received Payment, J. C. CARTER.

PHILADELPHIA, July 1st. 1852

3. *James Henry Esq.,*

Bought of C. B. Lawrence.

25lbs. gunpowder,	at	£0, 4s. 6d.,	£ 5, 12s. 6d.
36 guns,	"	£1, 12s. 6d.,	£58, 10s.
12 rifles,	"	£2, 8s.,	£28, 16s.
45 knapsacks,	"	£0, 12s. 6d.,	£28, 2s. 6d.
			£121, 1s.

Received Payment,

C. B. LAWRENCE.

NEW HAVEN, Feb. 12th, 1853.

4. *H. S. Williams, Esq.,*

Bought of Macy & Co.

27 lbs. sugar,	at	0s. 7d.,	£0, 15s. 9d.
36 drums figs,	"	4s. 6½d.,	£8, 3s. 6d.
17 boxes raisins,	"	6s. 7d.,	£5, 11s. 11d.
			£14, 11s. 2d.

Received Payment,

MACY & CO.

5. *J. Dill, Esq.,*

To H. L. & Co., Dr.

For 10 doz.	pair	silk hose,	at	4s. 8d.	a pair,	£28, 0s. 0d.
" 16 "	"	thread "	"	3s. 4½d.	"	£32, 8s. 0d.
" 21 "	"	worsted, "	"	4s. 6¼d.	"	£56, 19s. 3d.
						£117, 7s. 3d.

Received Payment,

H. L. & Co.

6. *M. P ——,*

Bought of James Gordon.

15 A. 2 R. 15 r. land=2495 rods, at £3, 15s. 7d.,=907d.	£9429, 0s. 5d.

Received Payment,

JAMES GORDON.

7. *A. B.,*

Bought of C—— D——.

1 piece land 68 r. by 25$\frac{1}{2}$ r. = 10$\frac{67}{80}$ A. at £6, 4s. 6d.,	£67, 9s. 3$\frac{9}{40}$d

Received Payment,

C—— D——.

8. *A. M.,*

To Elisha Fanning, Dr.

For	18 lbs. 4 oz. veal,	at	8$\frac{1}{4}$d. per lb.,	£0, 12s. 6$\frac{9}{16}$d.
"	16 lbs. 8 oz. mutton,	"	7$\frac{1}{2}$d. "	£0, 10s. 3$\frac{3}{4}$d
"	28 lbs. 4 oz. venison,	"	1s. 7d. "	£2, 4s. 8$\frac{3}{4}$d.
				£3, 7s. 7$\frac{1}{16}$d.

Received Payment,

E. FANNING.

9. *O. S.,*

Bought of C. Y.

10 oxen, each weighing 9 cwt. 15 lbs. (9150 lbs.,) at 8$\frac{1}{2}$d. per pound,	£324, 1s. 3d.

10. *B. H. L.,*

Bought of C. F.

43 T. 2 qrs. 17 lbs. iron, (86067 lbs.,) at 1s. 7d. per lb.,	£6813, 12s. 9d.

Received Payment, C. F

11. *A. T. Carpenter,*

To R. N. Dr.

For digging cellar, 62 ft. × 25 × 8$\frac{1}{2}$ = 487$\frac{26}{27}$ cu. yds., at 5$\frac{1}{2}$d. per cu. yd.,	£11, 3s. 7$\frac{43}{54}$d.

Received Payment, R. N.

12. *Richard Chamberlain, Cr.*

By 50 casks molasses, each containing 58$\frac{3}{4}$ gals. (2937$\frac{1}{2}$ gals.) at 2s. 6d.,	£367, 3s. 9d.

(Carried forward.)

(Brought forward),	£367,	3s.	9d.
Henry Dickinson, Dr.			
For 2722 gals. molasses, (2937½—215½) at 3s. 4d.,	£453,	13s.	4d.
Gained by the operation,	£86,	9s.	7d.

13. Bought 2 cwt. 3 qrs. 10 lbs. saltpetre, =285 lbs., at 3s. 7d. per lb.,	£ 51,	1s.	3d
Bought 16 cwt. 2 qrs. 17 lbs. dyewood, =1667 lbs., at 4s. 6d. per lb.,	£375,	1s.	6d.
Bought 5 cwt. 1 qr. 11 lbs. indigo, =536 lbs., at 15s. 8d. per lb.,	£419,	17s.	4d.
Amount,	£846,	0s.	1d.

14. *George Spencer,*

Bought of Henry Brown.

75	yds. broadcloth,	at	15s. 6d.,	£ 58,	2s. 6d.
115	" silk,	"	7s. 6d.,	£ 43,	2s. 6d.
263	" bombazine,	"	4s. 7d.,	£ 60,	5s. 5d.
325	" cassimere,	"	11s. 8d.,	£189,	11s. 8d.
				£351,	2s. 1d.

Received Payment,

HENRY BROWN.

DECIMAL FRACTIONS.

ART. **184.** (p. 178.)

(1.)

25 hundredths.
362 thousandths.
451 thousandths.
5675 ten thousandths.
8432 ten thousandths.

(2.)

5317 ten thousandths.
1056 ten thousandths.
4308 ten thousandths.
105 ten thousandths.
7 ten thousandths.

(3.)

3 and 245 thousandths.
7 and 6071 ten thousandths.
4 and 3159 ten thousandths.
3 and 87816 hundred thousandths.
5 and 91432 hundred thousandths.

(4.)

9 and 14712 hundred thousandths.
1 and 6231 hundred thousandths.
2 and 729 hundred thousandths.
1 and 14051 hundred thousandths.
8 and 6705 hundred thousandths.

(5.)

25 and 2 hundredths.
36 and 32 thousandths.
45 and 7056 ten thousandths.
12 and 7067 hundred thousands.

(6.)

56 and 78417 hundred thousandths.
21 and 5671 hundred thousandths.
42 and 5063 hundred thousandths.
95 and 10051 hundred thousandths.

(7.)

1 and 253456 millionths.
31689 millionths.
7 and 35042 millionths.
9 and 103005 millionths.

(8.)

2 and 8 millionths.
500072 millionths.
8 and 305001 millionths.
9 and 1 millionth.

ART. **184.** *a.* (p. 179.)

(9.)

2.5.
4.52.
28.06.
6.29.

(10.)

3.05.
45.62.
5.231.
6.023.

(11.)

15.6435.
10.534.
2.045.
300.0701.

(12.)

3.12567.
4.02005.
17.00201.
13.123567.

(13.)

.49.
.3.
.0445.
.07.
.005.

(14.)

.036.
.00025.
.000001.
.703.

(15.)

.07.
.003.
.0095.
.000063.
.0000026.

(16.)

46.005.
72.000007.
.003264.
64.009.
93.000016.

ADDITION OF DECIMALS.—(p. 180.)

ART. 187.

1, 2. Given.
3. 320.67.
4. 2986.0501.
5. 81.271.
6. 111.9925.
7. 8.5284508.
8. 19.57605.
9. 760.573.
10. 1310.9902.
11. 177.998.
12. 33.4013.
13. 330.967.
14. 10.709341.

15.
.5.
.25
.566
.7568
2.0728. *Ans.*

16.
.34
.067
.0013
.000463
.408763. *Ans.*

17.
.007
.00063
.000047
.6
.607677. *Ans.*

18.
.0000423
.063
.25
.4
.0056
.7186423. *Ans.*

19
403.26
47.6
94.018
200.0005
744.8785. *Ans.*

20.
18.0045
60.000123
49.0000063
127.0046293. *Ans.*

SUBTRACTION OF DECIMALS.—(p. 181.)

ART. 189.

1, 2. Given.
3. 250.3905.
4. 14.544.
5. 13.25.
6. 144.96063.
7. 0.875.
8. 10.69995.
9. 0.23578.
10. 1.1011.
11. 1.400091.
12. 0.999999.
13. 130.8410699.

14. 8897.319507.
15. 55999.999901.

16.
.75
.075
.675. *Ans.*

17.
.006
.000006
.005994. *Ans.*

18.
.3252
.003
.3222. *Ans.*

19.
539.000
.022
538.978. *Ans.*

20.
7856.000000
.000236
7855.999764. *Ans.*

21.
.5
.05
.45. *Ans.*

22.
.006
.0007
.0053. *Ans.*

23.
.00007
.000009
.000061. *Ans.*

24.
47.24
7.063
40.177. *Ans.*

25.
506.000099
243.099
262.901099. *Ans.*

26.
29000.000
.029
28999.971. *Ans.*

27.
.45
.045
.405. *Ans.*

28.
.569
.000569
.568431. *Ans.*

29.
.9
.019
.881 A. *Ans.*

30.
1.000
.215
.785 hhd. *Ans.*

31.
75.17
36.007
39.163 yds. *Ans.*

MULTIPLICATION OF DECIMALS.

EXAMPLES FOR PRACTICE.—(p. 184.)

1. 231.41 yds.
2. 259.875 gals.
3. 589.875 ft.
4. 371.25 cords.
5. 510.875 rods.
6. 474.6875 miles.
7. 65365 lbs.
8. 44.3955 bbls.
9. 0.50005.
10. 50 1565195.

ART. 192.

11. Given.
12. 2650.1.
13. 5678.
14. 0.00187440781.
15. 0.0024048072.
16. 0.000058175003.
17. 0.0004000751.
18. 0.08568931.
19. 0.00031275.
20. 0.0000022780402.

21. .5
.000005
.0000025. *Ans.*

22. .15
.0028
120
30
.000420. *Ans.*

23. .00025
7.3
00075
00175
.001825. *Ans.*

24. .000225
2.85
001125
001800
000450
.00064125. *Ans.*

25. .0002367
3.0002
0004734
7101
.00071014734. *Ans.*

26. .07606
.253
.01899018. *Ans.*

27. 2.00641
.0032
.006420512. *Ans.*

28. .000015230.
29. 371.0846634.
30. .00194944563.
31. 56.44306340.
32. .0037503660.
33. .174441456.
34. 189.344142242.
35. 172.922637063.

36. .002
.0002
.0000004. *Ans.*

37. .000005
.061
000005
000030
.000000305. *Ans.*

38. .0000263
.0048
2104
1052
00000012624. *Ans.*

39. .0000000007
.002156
00000000042
00000000035
00000000007
00000000014
.0000000000015092.
Ans

DIVISION OF DECIMALS.

EXAMPLES FOR PRACTICE—(p. 186.)

1. 6 coats.
2. 9 loads.
3. 12.3 days.
4. 23.9139 acres.
5. 4.5 rods.
6. 3.15 bbls.
7. 24.3936 days.
8. 6.9 days.
9. 15 boxes.
10. 14.3.

Art. 195. (p. 187.)

11, 12. Given.
13. 0.8.
14. 0.001777+.
15. 2.4.
16. 10000.
17. 5000000.
18. 17.6.
19. 0.62.
20. 31.7199+.
21. 24.578075.
22. .8576034.
23. 910000000000.
24. 990000000000.
25. .000078435.
26. .0000009034.

27. .0015).000424

Ans. .2826+.

28. 7.0016)248.008

Ans. 35.4216+.

29. 1.000019)6.0000125

Ans. 5.999898+.

30. 3.000009)63.000000081

Ans. 20.99993+.

31. .9226).856978

Ans. .92887+.

32. 29.0265)45.0476299

Ans. 1.551948+

33. .025
.07
.0046).00175

Ans. .38+

34. 26.0085
.06
.015)1.560510

Ans. 104.034.

35. .0038
.38
38).3838

.0101. *Ans.*

REDUCTION OF DECIMALS.—(p. 188.)

Art. 196.

1. Given.
2. $\frac{1}{5}$.
3. $\frac{33}{50}$.
4. $\frac{3}{4}$.
5. $\frac{3}{8}$.
6. $\frac{21}{25}$.

7. $\frac{1}{40}$.
8. $\frac{7}{8}$.
9. $\frac{1}{16}$.

ART. 197. (p. 189.)

1—3. Given.
4. 0.75; .8.
5. 0.15; .28.
6. 0.375; .2; .6.
7. 0.8; .8333+; .1.
8. 0.16; .4; .04.
9. 0.625; .4; .05.
10. 0.025; .0028+.
11. 0.025; .003.

ART. 199.

12, 13. Given.
14. .03703 &c.
15. .142857142 &c.
16. .0769237 &c.
17. .025.
18. .23125.
19. .8125.
20. .026875.
21. .04761947 &c.
22. .071428571 &c.

ART. 200. (p. 190.)

1, 2. Given.

3.
$$\begin{array}{r|l} 12 & 6.0\text{d.} \\ \hline 20 & 15.5\text{s.} \\ \hline & \text{£}.775. \end{array}$$
Ans.

4.
$$\begin{array}{r|l} 4 & 1.00 \text{ far.} \\ \hline 12 & 6.25\text{d.} \\ \hline 20 & 12.520833+\text{s.} \\ \hline \end{array}$$
Ans. £.6260416+.

5.
$$\begin{array}{r|l} 12 & 9\text{d.} \\ \hline 20 & 0.75\text{s.} \\ \hline \end{array}$$
Ans. £.0375.

6.
$$\begin{array}{r|l} 4 & 2 \text{ far.} \\ \hline 12 & 7.50\text{d} \\ \hline \end{array}$$
Ans. 2.625s.

7.
$$\begin{array}{r|l} 2 & 1 \text{ pt.} \\ \hline 4 & 2.50 \text{ qts.} \\ \hline 63 & 5.625 \text{ gals.} \\ \hline \end{array}$$
Ans. .0892857 hhd.

8.
$$\begin{array}{r|l} 60 & 9 \text{ min.} \\ \hline 24 & 18.15 \text{ hrs.} \\ \hline \end{array}$$
Ans. .75625 d

9.
$$\begin{array}{r|l} 25 & 15 \text{ lbs.} \\ \hline 4 & 2.60 \text{ qrs.} \\ \hline 20 & 5.65 \text{ cwt.} \\ \hline \end{array}$$
Ans. .2825 ton

10.
$$\begin{array}{r|l} 12 & 6 \text{ in.} \\ \hline 3 & 2.50 \text{ ft.} \\ \hline \end{array}$$
Ans. .833+ yd.

11.
$$\begin{array}{r|l} 40 & 30 \text{ rods.} \\ \hline 8 & 6.75 \text{ fur.} \\ \hline \end{array}$$
Ans. .84375 m

12.
$$\begin{array}{r|l} 16 & 8 \text{ drs.} \\ \hline 16 & 13.50 \text{ oz.} \\ \hline \end{array}$$
Ans. .84375 lb.

13.
$$\begin{array}{r|l} 12 & 9.75\text{d.} \\ \hline \end{array}$$
Ans. .8125 shilling

14.
4 | 1 far.
12 | 0.25d.
20 | 5.02083+s.
Ans. £.25104+.

15.
4 | 3 far.
12 | 6.75d.
20 | 5.5625s.
£31.278125. *Ans.*

16.
2 | .4 pt.
4 | .200 qt.
63 | .050000 gal.
Ans. .00079365+ hhd.

17.
25 | .75 lb.
4 | .03 qr.
20 | .007500 cwt.
Ans. .000375 ton.

ART. **201.** *a.* (p. 192.)

1, 2. Given.

3.
.625 shil.
12
7.500d.
4
2.000 far.
Ans. 7d. 2 far.

4.
£.4625
20
9.2500s.
12
3.0000d.
Ans. 9s. 3d.

5.
.756 gal.
4
3.024 qts.
2
.048 pt.
Ans. 3 qts. .048 pt.

6.
.6254 day.
24
25016
12508
15.0096 hrs.
60
.5760 min.
60
34.5600 sec.
Ans. 15 hrs. 34 56 sec.

7.
.856 cwt.
4
3.424 qrs.
25
2120
848
10.600 lbs
16
9.600 oz.
16
9.600 drs.
Ans. 3 q. 10 lbs. 9 oz. 9.6 d

8.
.6945 T.
20
13.8900 cwt.
4
3.5600 qrs.

(carried for'd.)

Brought for'd.)
3.5600 qrs.
25
28000
11200
14.0000 lbs.
Ans. 13 cwt. 3 qrs. 14 lbs.

9. .7582 bu.
4
3.0328 pk.
8
.2624 qt.
2
.5248 pt.
Ans. 3 pks. .5248 pt.

0. .8237 m.
8
6.5896 fur.
40
23.5840 rods.
$5\frac{1}{2}$
29200 (car. for'd.)

(Brought for'd.)
29200
2920
3.2120 yds.
3
.6360 ft.
12
7.6320 in.
6 fur. 23 r. 3 yds. 7.632 in.
Ans.

11. .45683 acre.
4
1.82732 R.
40
33.09280 rods.
Ans. 1 R. 33.0928 rods.

12. .75631 yd.
4
3.02524 qrs.
4
.10096 na.
Ans. 3 qrs. .10096 na

EXERCISES IN DECIMAL COMPOUND NUMBERS.

ART. 202. (p. 192.)

2. £.125=2s. 6d.
.4s.=0s. $4\frac{4}{5}$d.
Ans. 2s. $10\frac{4}{5}$d.

3. £.625=12s. 6d.
.25s.= 0s. 3d.
.75d.= 0s. 0d. 3 far.
Ans. 12s. 9d. 3 far.

4. .275 T.=5 cwt. 50 lbs.
.08 cwt.=0 cwt. 8 lbs.
Ans. 5 cwt. 58 lbs.

5. .6 A.=96 r. 0 ft.
.4 r.= 0 r. 108.9 ft.
Ans. 96 r. 108.9 ft.

6. £.65=13s. 0d.
6.5s.=£.375= 6s. 6d.
Ans. £.275= 6s. 6d.

7. .875s.=10d. 2 far.
.25d.= 0d. 1 far.
Ans. 10d. 1 far.

8. .231 T.=4 cwt. 62 lbs.
.75 cwt.=0 cwt. 75 lbs.
Ans. 5 cwt. 37 lbs.

10. £⅕=£.2.
⅙s.=£.00833+.
Ans. £.20833+.

9. .775 m.=248 r.
.75 r.=.75 r.
Ans. 248.75 rods.

11. £⅘=£.8.
¾d.=£.003125.
Ans. £.796875.

12. .778125 T.=1556.25 lbs.
1556.25×2½s.=3890.625s.
3890.625s.=£194, 10s. 7d. 2 far. *Ans.*

13. .94375 A.=151 r.
151 r.×$2½=$377.50. *Ans.*

14. .75631 yd.=12.10096 na.
12.10096×3d.=3s. 1.21152 far. *Ans.*

15. 17 cwt. 2 qrs. 16 lbs.=17.66 cwt.
17.66×$27=$476.82. *Ans.*

16. 18 cwt. 1 qr. 18 lbs.=18.43 cwt.
18.43×$63=$1161.09. *Ans.*

17. 56 hhd. 16 gals. 3 qts.=56.26587+hhd.
£6. 17s. 6d.=£6.875,
56.26587×£6.875=£386.82785625.
£386.82785625=£386, 16s. 6d. 2.742 far. *Ans.*

18. 15¾ C.=15.75 cords.
15.75×£.905=£14.25375.
£14.25375=£14, 5s. 3.6 far. *Ans.*

19. 75 yds. 1 qr. 2 na.=75.375 yds.
75.375×£.25=£18.84375,
£18.84375=£18, 16s. 10d. 2 far. *Ans.*

20. $¼=$.25,
$.25÷.175=$1.42857. *Ans.*

21. £⅞=£.875,
£.875÷.625=£1.4,
£1.4=£1, 8s. *Ans.*

22. $⅚=$.8333+,
$.8333÷.125=$6.666+. *Ans.*

23. .965625×24×7=162.225 m.
162.225 m=162 m. 72 r. *Ans.*

24. .778125 T.=1556.25 lbs.
1556.25×2s.=3112.5s.
3112.5s.=£155, 12 s. 6d. *Ans.*

25. .815625 lb.=4698 grs.
4698×5s.=23490s.
23490s.=£1174, 10s. *Ans.*

26. .45683 A.=19899.5148f.
19899.5148×$.5=
$9949.7574. *Ans.*

27. .125 cwt.=12.5 lbs.
£.775÷12.5=£.062,
£.062=1s. 2d. 3.52 far. *Ans.*

28. .5 lb.=8 oz.
£.375÷8=£.046875,
£.046875=11d. 1 far. *Ans.*

29. £.328÷.41=£.8 pr. bbl.
£.8÷31.5=£.0253968+
£.0253968=6.095232d. *Ans.*

30. $\frac{3}{4}$ cwt.=75 lbs.
75×$.122=$9.15. *Ans.*

31. 28 lbs. 3 oz.=.281875cwt
(See Art. 200.)
.281875×£.928=
£.26158,
£.26158=5s. 2d. 3.1168 f. *Ans.*

32. .33 cwt.=33 lbs.
£.825÷33=£.025.
£.025=6d. *Ans.*

33. £.315÷.07875 hhd.=
£4, price per hhd.
£4=960d.; 1 hhd.=
252 qts.
960d.÷252=$3\frac{5}{6}\frac{1}{3}$d. *Ans.*

Or, .07875 hhd.=19.845qts.
£.315÷19.845=
£.015873+.
£.015873=3.80952d. *Ans.*

FEDERAL MONEY.—(p. 194.)

ART. 207.

(1.)

250 dolls., and 56 cents.
105 dolls., 86 cts., and 3 mills.
200 dolls., 5 cts., and 7 mills.
506 dolls., 50 cts., and 7 mills.
850 dolls., 7 cts., and 1 mill.

(2.)

44 dolls., 8 cts., and 1 mill.
60 dolls., and 5 cts.
75 dolls., and 3 mills.
20 dolls., 50 cts., and 1 mill.
30 dolls., 6 cts., and 5 mills.

(3.)

3 dolls. 75 cts., 4 mills, and 2 tenths of a mill.
60 cts., 5 mills, and 4 tenths of a mill.
4 dolls., 1 ct., 5 mills, and 1 tenth of a mill.
6 dolls., 5 mills, and 7 tenths of a mill.
8 dolls., 1 ct., and 6 tenths of a mill.

4. Given.
5. $150.73.
6. $201.09.
7. $300.053.
8. $4.068.
9. $100.0753.
10. $1000.00636.

REDUCTION OF FEDERAL MONEY.—(p. 195.)

Art. 208.

2. 90 mills.
3. 25000 mills.
4. 500 cents.
5. 364000 mills.
6. 621000 mills.
7. 624500 cents.
8. 7526 cents.
9. 62548 cents.

Art. 209. (p. 196.)

11. 15 cents.
12. $25.
13. $3.25.
14. 42 cents, 3 mills
15. $4.32.
16. $635.
17. 489 cents.
18. $95.673.

ADDITION OF FEDERAL MONEY.—(p. 197.)

Art. 211.

1. Given.
2. $12.13.
3. $45.805.
4. $363.433.
5. $270.279.
6. $281.033.
7. $196.51.
8. $1022.529.
9. $76.121.
10. $216.723.
11. $317.207.
12. $10.545.
13. $2377.69¼.
14. $1409.8978.
15. $114.7775.

SUBTRACTION OF FEDERAL MONEY.—(p. 198.)

Art. 212.

1, 2. Given.
3. $10.36.
4. $81.33.
5. $41.60.
6. $339.67.
7. $156.87.
8. $0.004.
9. $0.174.
10. $54.422.
11. $100.088.
12. $900.055.
13. $.05625.
14. $213.125.

MULTIPLICATION OF FEDERAL MONEY.—(p. 199.)

ART. 215.

1—4. Given.
5. $.105×14=$1.47.
6. $.095×15.5=$1.4725.
7. $.1875×25=$4.6875.
8. $.285×23.25=$6.62625.
9. $.125×33.5=$4.1875.
10. $9.140.625.

ART. 216. (p. 200.)

11 Given.
12 $6.75
8 25
33 75
135 0
5400
1|000)$5|568.75
Ans. $5.56875.

13. $5.625.
14. $13.786875.
15. $77.46875.
16. $38.85425.
17. 12½cts.=$ .125
456¾ yds.=456.75
Ans. $57.09375.
18. $24.18.
19. $38.1875.
20. $18.375.
21. $142.50.
22. $13.005.
23. $127.50.
24. $1071.60.
25. $577.746.
26. $26.705.
27. $125.75088.
28. $36.2175.
29. $1071.
30. $8970.

DIVISION OF FEDERAL MONEY.—(p. 201.)

ART. 219.

1—6. Given.
7. .0775)$1.2400
Ans. 16 qts.
8. 25.5 lbs.
9. 24 melons.
10. 36 pen-knives.
11. 25.142+quarts.
12. $3.50.
13. $1.8673+.
14. 66 cords.
15. 1.7894+bbl.
16. $0.07.
17. 52 weeks.
18. $1.3698+.
19. $0.02.
20. $1.25.
21. 465.55+bu.
22. $10.2816.
23. $10.914.
24. $68.493+.
25. 9 yds.
26. 252 bbls.
27. $075.
28. $0.125+.
29. 600 tons

APPLICATIONS OF FEDERAL MONEY.—(p. 204.)

Boston, May 25th, 1845.

1. *James Brown, Esq.,*

Bought of Fairfield & Lincoln.

5 yds. of broadcloth,	at	$3.25,	$16.25
3 yds. of cambric,	"	.12½,	.375
3 doz. buttons,	"	.15,	.45
6 skeins sewing silk,	"	.06¼,	.375
4 yds. wadding,	"	.08,	.32
		Amount,	$17.770

New Haven, Sept. 2d, 1845.

2 *Hon. R. S. Baldwin,*

To Durrie & Peck, Dr.

For 4 Lovell's Young Speaker,	at	$ .62½,	$2.50
" 5 Olmsted's Rudiments,	"	.58,	2.90
" 6 Morse's Geography,	"	.50,	3.00
" 8 Webster's Spelling Book,	"	.10,	0.80
" 3 Day's Algebra,	"	1.25,	3.75
		Amount,	$12.95

New York, Aug. 18th, 1845.

3 *John Jacob Astor, Esq.,*

Bought of G. W. Lewis & Co.

25 lbs. sugar,	at	$ .09,	$2.25
50 " coffee,	"	.11,	5.50
12 " tea,	"	.75,	9 00
14 " raisins,	"	.14,	1.96
9 doz. eggs,	"	.10,	0.90
15 lbs. butter,	"	.12½,	1.875
		Amount,	$21.485

PHILADELPHIA, June 3d, 1845

4 *W. A. Sanford, Esq.*,

To James Conrad, Dr.

For 28 yards silk,	at	$1.25,	$35.00
" 22 " muslin,	"	.56,	12.32
" 16 pair cotton hose,	"	.37½,	6.00
" 35 " silk "	"	1.10,	38.50
" 25 " shoes,	"	1.25,	31.25
		Amount,	$123.07

CINCINNATI, July 1st, 1845.

5. *Messrs. Holmes & Homer*,

To W. H. Morgan & Co., Dr.

For 100 bbls. flour,	at	$4.50,	$450.00
" 50 " pork,	"	8.25,	412.50
" 25 " beef,	"	9.75,	243.75
" 112 kegs lard,	"	3.25,	364.00
" 25 bush. corn,	"	.34,	8.50
		Amount,	$1478.75

NEW ORLEANS, Aug. 12th, 1875.

6. *F. C. Emerson, Esq.*,

Bought of W. H. Arnold & Co.

35 hhds. molasses,	at	$12.60,	$441.00
2100 lbs. sugar,	"	.05½,	115.50
14000 " cotton,	"	.07½,	1050.00
1350 " coffee,	"	.06¼,	84.375
31200 " rice	"	.08,	2496.00
150 boxes oranges,	"	4.12½,	618.75
		Amount,	$4805.625

CREDIT.

500 clocks, at $5.00, ...	$2500.00
Note to balance account, ...	2305.625

7. *A. B.,*

Bought of C. D.

19	yds. broadcloth,	at	$5.63,	$106.97
18	doz. pen-knives,	"	4.37½,	78.75
78	lbs. tea,	"	.59,	46.02
245	" butter,	"	.13,	31.85
			Amount,	$263.59

8 *C. D.,*

Bought of E. F.

85	cwt. beef,	at	$6.25,	$531.25
126	bbls. pork,	"	18.62½,	2346.75
243	" flour,	"	6.87½,	1670.625
35	tons hay,	"	19.50,	682.50
25	cords wood,	"	3.56¼,	89.0625
			Amount,	$5320.1875

9. *G. H.,*

Bought of X. Y.

35	doz. gloves,	at	$4.50,	$157.50
95	yards black silk,	"	.87½,	83.125
115	" col'd. "	"	.78,	89.70
36	crape shawls,	"	32.50,	1170.00
65	broché "	"	17.83,	1158.95
			Amount,	$2659.275

10. *A. L.*

Bought of Y. Z.

85	ploughs,	at	$9.63,	$818.55
125	hoes,	"	.63,	78.75
94	shovels,	"	.84,	78.96
56	rakes,	"	.28,	15.68
67	axes,	"	1.13,	75.71
			Amount,	$1067.65

11. *A. B. C.,*

To X. Y. Z., Dr.

For	96	pair silk hose,	at	$0.83,	$79.68
"	85	" white "	"	.87½,	74.375
"	135	" worsted "	"	.56¼,	75.9375
"	87	" men's gloves,	"	.67,	58.29
"	120	" ladies' "	"	.58,	69.60
"	75	cravats,	"	.96,	72.00
				Amount,	$429.8825

12. *H. C. D.,*

To J. M., Dr.

For	67	Latin Readers,	at	$0.63,	$42.21
"	60	Greek "	"	1.09,	65.40
"	84	Greek Grammars,	"	.68,	57.12
"	95	Latin "	"	.62½,	59.375
"	35	Virgil,	"	2.13,	74.55
"	45	Sallust,	"	.78,	35.10
"	52	Cicero's Orations,	"	.75,	39.00
				Amount,	$372.755

13. *P. S.,*

To M. A. T., Dr.

For	36	pair boots,	at	$5.17,	$186.12
"	216	" thick shoes,	"	1.37½,	297.00
"	135	" gaiters,	"	1.38,	186.30
"	240	" buskins,	"	.83,	199.20
"	134	" slippers,	"	.68,	91.12
"	87	" rubbers,	"	1.13,	98.31
				Amount,	$1058.05

PERCENTAGE.—(p. 206.)

Art. 223.

1. .01; .02; .03; .05; .08; .09.
2. .13; .15; .30; .50; .75; .49; .73; .85.
3. .005; .0025; .002; .0075; .008; .003; .00125; .00333+; .001666+; .001428571428, &c.

Note.—The last answer is a circulating decimal. (Art. 199.)

4. .035; .054; .16125;
1.25; 3.3125; 4.625.

ART. **225.** (p. 207.)

5—8. Given.
9. $0.9021.
10. $2.069075.
11. $0.96474.
12. $0.1809.
13. $60.0451.
14. $300.0756.
15. $450.168.
16. $13.952.
17. $3.36.
18. $11.565.
19. $58.8875.
20. $21.
21. $1398.
22. 129.75 boxes lost.
735.25 boxes left.
23. $63.333+.
24. $106.8431.
25. $1.3332+.
26. $468.75, sum lost.
$1031.25, amount left.
27. $1285.35.
28. $37.50; $951.5625.
29. $168.
30. $793.75.
31. $43.375.
32. $1000×.07=$70
$1100×.06=$66
Difference, $4.
33. $120.
34. $2000×.09=$180
$3000×.06=$180
No difference.
35. $1720.
36. $2152.50.
37. The elder had $11550
The younger, $ 8450
Difference, $ 3100.
38. $172.125.
39. $588.671875.
40. 1780 sheep.

COMMISSION, BROKERAGE, AND STOCKS

ART. **232.** (p. 210.)

1. Given.
2. $16.0068.
3. $21.51125.
4. Agent received $5.97.
Owner received $259.38.
5. $15.426+.
6. $15.60.
7. $10.226+.
8. $70.993.
9. Given.

ART. **232.** *a.* (p. 211.)

10. 1.005)$10478.130
Stock, $10426.
Brokerage, $52.13.
11. $5000 Bill.
.07, pr. ct.
$350.00. *Ans.*
12. $454.575.
13. $521.93.
14. $29.27.

15. $406.437.
16. $3753.915.
17. $1759.308.
18. $477.65.
19. $7526.
20. $5000.

22. $500 stock.
.055, per ct.
2500
2500
$27.50 prem.
500.00 stock.
$527.50. *Ans.*

23. $1500 stock.
.15, per ct.
7500
1500
$225.00 dis.
$1500—$225=$1275.
Ans.

24. $2900 stook.
.16, per ct.
17400
2900
$464.00 prem.
$2900.00 stock.
$3364. *Ans.*

25. $4500 stock.
.03, per ct.
$135.00 dis.
$4500—$135=$4365 cost.
$4500 stock.
.07, per ct.
$315.00 prem.
(car. for'd.)

(Brought for'd.)
$315.00 prem.
$4500.00 stock.
$4815 selling price
$4365 cost.
$450 gain. *Ans.*

26. $9000 stock.
.75, per ct.
$6750.00 dis. *Ans.*

27. $5300 stock.
.13, per ct.
15900
5300
$689.00 prem.
$5300.00 stock.
$5989. *Ans.*

28. $3800 stock.
.07, per ct.
$266.00 prem.
$3800.00 stock.
$4066 cost.
$3800 stock.
.05, per ct.
$190.00 dis.
$3800—$190=$3610.
$4066—$3610=$456 loss.
Ans.

29. $25265÷1.03=
$24529.1262+.
$25265—$24529.1262=
$735.8738. *Ans.*

30. $62470÷1.025=
$60946.34146+. *Ans.*

30. $62470 ÷ 1.025 = $60946.34146+. *Ans.*

31. 31¼ yds × 5 = 156¼ yds.
156.25 × $3.875 = $605.46875,
$605.46875 × .055 = 33.30078+,
$605.46875 − $33.30078 = $572.16797.+ *Ans.*

32. 483½ × 65 × .045 = $1414.2375,
$1414.2375 × .0325 = $45.9627+. *Ans.*

33. 365½ × .875 = $319.8125,
$319.8125 × .0475 = $15.19109+,
$319.8125 − $15.19109 = $304.6214+. *Ans.*

INTEREST.—(p. 213.)

ART. **241.** (p. 215.)

1—4. Given.
5. $5; $6; $4; $7.
6. $2.118.
7. $3.507.
8. $3.465.
9. $6.153.
11. $9.817 interest;
$150.067 amount.
12. $13.072 interest;
$176.472 amount.
13. $24 interest;
$424 amount.
14. $535.
15. $1080.
18. $60 interest;
$260 amount.
19. $175 interest;
$425 amount.
20. $81.72 interest;
$422.22 amount.
23. $5.833.
24. $5.629.
25. $2.80 interest;
$62.80 amount.
26. $4.80 interest;
$100.80 amount.
27. $0.10.
28. $0.522.
29. $65.166.
30. $7.437.
31. $9.26.
32. $2.638.
33. $7.526.
34. $29.043
35. $18.235.
36. $206.58.
37. $4.19375.
38. $2.916.
39. $5.
40. $108.515.
41. $8367.29 prin.
.07 rate.
4)585.7103 int. 1 yr.
146.42757 " 3 mo.
27.65841 " 17 d.
174.08598 *Int.*
8367.29 prin. add.
$8541.37598 *Amt.*

42. $4565.61 prin.
.06 rate.
3)273.9366, int. 1 yr.
91.3122 " 4 mo.
5.3265 " 7 d.
96.6387 *Int.*
4565.61 prin. add.
$4662.2487 *Amt.*

43. $5625.43 prin.
.06¼ rate.
3)351.589375, int. 1 yr.
117.196458 " 4 mo.
17.579468 " 18 d.
$134.775926. *Ans.*

44. $624.625 prin.
.055 rate.
2)34.354375, int. 1 yr.
6)17.1771875 " 6 mo.
10)2.8628645 " 1 mo.
.2862864 " 3 d.
$20.3263384. *Ans.*

45. $11261.18¾ prin.
.08 rate.
4)900.8950, int. 1 yr.
225.22375 " 3 mo.
7.50745 " 3 d.
$232.73120. *Ans.*

46. $9208.95 prin.
.07 rate.
644.6265, int. 1 yr.
590.9077 " 11 mo.
8.9532 " 5 d.
$599.8609 *Int.*
$9808.8109 *Amt*

47. $15206.843 prin.
.075 rate.
$1140.513225, int. 1 yr.
760.342150 " 8 m.
79.202307 " 25 d.
1980.057682 *Int.*
15206.843 prin. add.
$17186.900682 *Amt.*

48. $10050.69 prin.
.055 rate.
552.78795, int. 1 yr.
2
1105.57590 " 2 yrs.
414.59094 " 9 mo.
7.67761 " 5 d.
$1527.84445 *Int.*
10050.69 prin. add.
$11578.53445 *Amt.*

49. $11607.858 prin.
.07 rate.
812.55006, int. 1 yr.
3
2437.65018 " 3 yrs.
406.27503 " 6 mo.
20.31375 " 9 d.
$2864.23896 *Int.*
$14472.09696 *Amt.*

50. $41361.18 prin.
.06 rate.
2481.6708, int. 1 yr.
5
12408.3540 " 5 yrs.
1447.6413 " 7 mo.
20.68059 " 3 d.
$13876.67589 *Int.*
$55237.85589 *Amt.*

SECOND METHOD.—(p. 218.)

Art. 246. (p. 219.)

1, 2. Given.

3. $268.40 prin.
.04, int. $1 for time.
6)10.7360 " 8 m. 6 pr. ct.
1.7893 " ⅙ added.
$12.5253. *Ans.*

4. $217.375 prin.
.03, int. $1 for t.
6)6.52125 " 6m. 6pr. ct.
1.086875 " ⅙ added.
$5.434375. *Ans.*

5. $169.25 prin.
.035, int. $1 for t.
$5.92375. *Ans.*

6. $350.192 prin.
.0425, int. $1 for t.
$14.883160. *Ans.*

7. $68.29 prin.
.0371⅔, int. $1 for t.
6)2.538111, at 6 pr. ct.
.423016, ⅙ added.
$2.961127. *Ans.*

8. $96.17. prin.
.058⅓, int. $1 for t.
6)5.60991, at 6 pr. ct.
(carried for'd.)

(Brought for'd.)
6)5.60991, at 6 pr. ct.
.93498, ⅙ subt.
$4.67493. *Ans.*

9. $168 prin.
.158⅓, int. $1 for t.
$26.60. *Ans.*

10. $173 prin.
.1875, int. $1 for t.
$32.4375. *Ans.*

11. $145 prin.
.034, int. $1 for t.
$4.930. *Ans.*

12. $461.318 prin.
.115, int. $1 for t.
6)53.051570 " 6 pr. ct.
8.841928, ⅙ added.
$61.893498. *Ans.*

13. $300 prin.
.023, int. $1 for t.
6)6.900, at 6 pr. ct.
1.150, ⅙ added.
$8.050. *Ans.*

14. $256.25 prin.
.0475, int. $1 for t
6)12.171875 " at 6 pr. ct.
2.028645, ⅙ subt.
$10.143230. *Ans.*

16.

	Yr.	*mo.*	*d.*
	1853	10	13
	1853	4	15
Time,		5	28

$753.28 principal.
.0296⅔, int. $1 for time.
6)22.347306, at 6 pr. ct.
3.724551, ⅙ added.
$26.071857. *Ans.*

17.
Yr. *mo.* *d.*
1852 6 10
1851 11 16
Time, 6 24

$631.375 principal.
.034, int. $1 for time.
6)21.466750, at 6 pr. ct.
3.577791, ⅙ added.
$25.044541. *Ans.*

18.
Yr. *mo.* *d.*
1850 12 14
1850 3 7
Time, 9 7

$729.93 principal.
.0461⅔, int. $1 for time.
6)33.698435, at 6 pr. ct.
5.616405, ⅙ subt.
$28.082030. *Ans.*

ART. **247.** *a.* (p. 221.)

19. Given.

20.
$519.38 prin.
.06 rate.
31.1628, int. 1 yr.
65 days.
365)2025.5820
$5.5495. *Ans.*

Or,
$519.38 prin.
65 days.
259690
311628
6|000)33|759.70
$5.62661. *Ans.*

Or, $519.38 prin.
.10⅚, ⅙ of days.
$5.62661. *Ans.*

21.
$761.56 prin.
.07 rate.
53.3092, int. 1 yr.
217 days.
365)11568.0964
$31.6934. *Ans.*

Or,
$761.56 prin.
217 days.
6|000)165|258.52 prod.
6)27.54308, 6 pr. ct.
4.59051, 1 pr. ct.
Ans. $32.13359, 7 pr. ct.

Or, $761.56 prin.
36⅙, ⅙ of days
6)27.54308, 6 pr. ct.
4.59051
$32.13359. *Ans.*

22.
$850.395 prin.
.05 rate.
42.51975, int. 1 yr.
318 days.
365)13521.28050
$37.04460. *Ans.*

23.
$781 13 prin.
.07 rate.
54.6791, int. 1 yr.
35 days.
365)1913.7685
(carried for'd.)

(Brought for'd.)
365)1913.7685
5.2432 *Int.*
781.13 prin. add.
$786.3732 *Amt.*

24. $806.28 prin.
.06 rate.
48.3768 (car. for'd.)

(Brought for'd.)
48.3768
46 days.
365)2225.3328
6.0968 *Int.*
806.28 prin. add
$812.3768 *Amt.*

25. June, 14 days.
July, 31 "
Aug., 31 "
Sept., 21 "
Time, 97 "

$923.68 principal,
.07 rate.
64.6576, interest for 1 yr
97 days,
365)6271.7872
$17.1829. *Ans.*

26. April, 27 days.
May, 31 "
June, 30 "
July, 31 "
Aug., 31 "
Sept., 15 "
Time, 165 "

$673.21 principal,
.06 rate.
40.3926
165 days.
365)6664.7790
18.2596 *Int.*
673.21 prin added.
$691.4696 *Amt.*

27. $709.81 prin.
.07 rate.
49.6867
95 days.
365)4720.2365
12.9321 *Int.*
709.81 prin. add.
$722.7421 *Amt.*

28. $1563.875 prin.
.07 rate.
109.47125
338 days.
365)37001.28250 (car. for.)

(Brought for'd.)
365)37001.28250
101.37337 *Int.*
1563.875 prin. add
$1665.24837 *Amt.*

29. $1604.17 prin.
.07 rate.
112.2919
308 days.
365)34585.9052
94.7559 *Int.*
1604.17 prin. add.
$1698.9259 *Amt*

30.

	Yr.	*mo.*	*d.*
	1853	6	19
	1851	3	4
Time,	2	3	15

2 yr. = 730 days.
March, 27 "
April, 30 "
May, 31 "
June, 19 "
Time, 837 days.

$2043.63 principal,
.06 rate.
122.6178
837 days.
365)102631.0986
281.1810 *Int.*
2043.63 prin. added.
$2324.811. *Amt.*

EXAMPLES FOR PRACTICE.—(p. 222.)

1. $1.81.
2. $5.021.
3. $1.642.
4. $0.916.
5. $13.904.
6. $242.316.
7. $391.613.
8. $42.
9. $224.193.
10. $675.863.
11. $898.88.
12. $1260.994.
13. $108.616.
14. $2.815.
15. $1022.25.
16. $1500.
17. $3960.144.
18. $5125.
19. $1147.50.
20. $14.734.
21. $167.022.
22. $8635.505.
23. $16269.325.
24. Time, 1 yr. 4 m. 6 d.
$65.00 prin.
.06 rate.
3)$3.90, 1 yr. (car. for.)

(Brought for'd.)
3)$3.900, int. 1 yr.
1.300 " 4 m.
.065 " 6 d.
$5.265. *Ans.*

25. Time, 1 yr. 12 d.
$170 prin.
.07 rate.
$11.90, int. 1 yr.
.396 " 12 d.
$12.296. *Ans.*

26. Time, 1 yr. 5 m. 18 d.
$105.63 prin.
.05 rate.
$5.2815, int. 1 yr.
2.2006 " 5 m.
.2640 " 18 d.
$7.7461. *Ans.*

27. Time, 1 yr. 5 m. 21 d.
$234 prin.
.06 rate.
$14.04, int. 1 yr.
5.85 " 5 mo.
.819 " 21 d.
$20.709. *Ans.*

28. Time, 1 yr. 9 m. 6 d.
$195.22 prin.
.06 rate.
$11.7132, int. 1 yr.
8.7849 " 9 m.
.1952 " 6 d.
$20.6933. *Ans.*

29. Time, 1 yr. 2 m. 29 d.
$391 prin.
.08 rate.
$31.28, int. 1 yr.
5.2133 " 2 m.
2.5197 " 29 d.
$39.0130. *Ans.*

30. Time, 9 m. 9 d.
$510.83 prin.
.07 rate.
12)35.7581, int. 1 yr.
2.97984 " 1 m.
9
$26.81856 " 9 m.
.89395 " 9 d.
$27.71251. *Ans.*

31. Time, 5 m. 26 d.
$469.65 prin.
.06 rate.
12)28.1790, int. 1 yr.
2.3482 " 1 m.
5
11.7410 " 5 m.
2.0332 " 26 d.
$13.7742. *Ans.*

32. Time, 1 y. 6 m. 3 d.
$285 prin.
.07 rate.
$19.95, int. 1 yr.
(car. for'd.)

(Brought for'd.)
$19.95, int. 1 yr.
9.975 " 6 m.
.166 " 3 d.
$30.091 *Int.*
285.000 prin. add.
$315.091 *Amt.*

33. Time, 4 m. 22 d.
$391 prin.
.06 rate.
3)$23.46, int. 1 yr.
7.82 " 4 m.
1.43 " 22 d.
9.25 *Int.*
391.00 prin. add.
$400.25 *Amt.*

34. Time, 5 m. 21 d.
$623 prin.
.05 rate.
12)$31.15, int. 1 yr
2.5958 " 1 m.
5
$12.9790 " 5 m.
1.8165 " 21 d.
$14.7955 *Int.*
$623.0000 prin. add.
$637.7955 *Amt.*

35. Time, 1 yr. 3 d.
$589.20 prin.
.04 rate.
$23.5680, int. 1 yr.
.1964 " 3 d.
$23.7644 *Int.*
$589.20 prin. add
$612.9644 *Amt.*

3. Time, 9 m. 3 d.
$731.27 prin.
.04 rate.
4)$29.2508, int. 1 yr.
7.3127 " 3 m.
3
21.9381 " 9 m.
.2437 " 3 d.
$22.1818 *Int.*
$731.27 prin. add.
$753.4518 *Amt.*

7. Time, 4 yrs. 3 d.
$849 prin.
.06 rate.
$50.94, int. 1 yr.
4
$203.76 " 4 yrs.
.4245 " 3 d.
$204.1845. *Ans.*

3. Time, 2 yrs. 2 m. 19 d.
$966 prin.
.07 rate.
$67.62, int. 1 yr.
2
$135.24 " 2 yrs.
11.27 " 2 m.
3.568 " 19 d.
$150.078. *Ans.*

. Time, 1 yr. 2 m. 28 d.
$1539 prin.
.06 rate.
6)$92.34, int. 1 yr.
(car. for'd.)

(Brought for'd.)
6)$92.34, int. 1 yr.
15.39 " 2 m.
7.182 " 28 d.
$114.912. *Ans.*

40. Time, 5 yrs. 1 m. 18 d.
$1100 prin.
.05 rate.
$55.00, int. 1 yr.
5
275.00 " 5 yrs.
4.583 " 1 m.
2.7495 " 18 d.
$282.3325 *Int.*
$1100.0000 prin. add.
$1382.3325 *Amt.*

41. $1 prin.
.06 rate.
.06, int. 1 yr.
50
$3.00 *Int.*
$1.00 prin. add.
$4.00 *Amt.*

42 $0 01 prin.
.07 rate.
.0007, int. 1 yr.
500
.3500 " 500 yrs.
.01 prin. add.
$0.36 *Amt.*

PARTIAL PAYMENTS.—(p. 224.)

Art. 248.

43. Given.

44.	Principal, ...		$500.00
	Interest to first payment, Nov. 10th, (6 months,)		17.50
	Amount due on note, Nov. 10th, . .		$517.50
	1st payment, (to be deducted from amount,)		75.00
	Balance due Nov. 10th, ...		$442.50
	Int. on bal. to 2d payt., March 22d, (4 mo. 12 d.)		11.36
	Amount due March 22d, ...		$453.86
	2d payment, (to be deducted from amount,)		100.00
	Balance due March 22d, ...		$353.86
	Interest on balance to Sept. 28th, (6 mo. 6 d.)		12.80
	Amt. due on taking up the note, Sept 28th, 1843,		$366.66
45.	Principal, ...		$692.350
	Int. to first payment, Nov. 15th, 1843, (3 mo.,)		10.385
	Amount due on note, Nov. 15th, . .		$702.735
	1st payment, (to be deducted from amount,)		250.375
	Balance due, Nov. 15th, 1843, . . .		$452.360
	Int. on bal. to 2d payt., March 1st, (3 mo. 16 d.,)		7.989
	Amount due March 1st, ...		$460.349
	2d payment, (to be deducted from amount,)		65.625
	Balance due March 1st, 1844, . .		$394.724
	Int. on balance to July 4th, (1 yr. 4 mo. 3 d.,)		31.775
	Amt. due on taking up the note, July 4th, 1845,		$426.499
46.	Principal, ...		$1000.00
	Int. to 1st payt., (2 yrs. 6 mo. 20 d.,)	$127.77	
	1st payt. (being less than the int. due,)	125.00	
	Surplus interest unpaid Jan. 10th,	$ 2.77	
	Int. continued on Prin. to June 16th, (5 mo. 6 d.)	21.67	24.44
	Amount due June 16th, 1844, . . .		$1024.44

(carried forward.)

(Brought forward.)	$1024.44
2d payt. (being greater than the int.,)	93.00
Balance due June 16th,	$931.44
Int. on bal. to Feb. 20th, (8 mo. 4 d.,)	31.56
Amount due Feb. 20th,	$963.00
3d payt., (to be deducted from amt.,)	200.00
Balance due Feb. 20th,	$763.00
Int. on bal. to Aug. 1st, (5 mo. 11 d.,)	17.07
Amount due Aug. 1st, 1845,	$780.07

ART. **250.** (p. 228.)

47, 48. Given.

49. £75.625 prin.
.07 rate.
4)5.29375, int. 1 yr.
1.32343 " 3 m.
£6.61718 *Int.*
£6, 12s. 4d. *Ans.*

50. £96.9 prin.
.045 rate.
4.3605 int. 1 yr.
2
8.7210 " 2 yrs.
2.1802 " 6 m.
£10.9012 *Int.*
£10, 18s. 1 far. *Ans.*

51. £100 prin
.05 rate.
5.00, int. 1 yr.
2
10.00 " 2 yrs.
1.666 " 4 m.
£11.666 *Int.*
£100.000 prin. add
£111.666, or,
£111, 13s. 4d. *Amt*

52. £430.84166 prin
.06 rate
£25.8504996, int. 1 yr.
10.7710415 " 5 m.
£36.6215411 *Int.*
430.8416666 prin. add.
£467.4632077, or,
£467, 9s. 3d. *Amt.*

PROBLEMS IN INTEREST.—(p. 229.)

ART. **253.**

1, 2. Given.

3. $13.80)$82.80
Ans. 6 per ct.

4. $3.332)$40.000
Ans. 12 per ct.

5 $6.75)$56.50
Ans. $8\frac{10}{27}$ per ct.

6. $30.00)$225.00

Ans. $7\frac{1}{2}$ per ct.

7. $80.00)$600.00

Ans. $7\frac{1}{2}$ per ct.

8. $6.25)$31.25

Ans. 5 per ct.

9. $46.30)$416.70

Ans. 9 per ct.

10. $1750.00)$8750.00

Ans. 5 per ct.

ART. 254.

11, 12. Given.

13. $.05)$500.00.

$10000. *Ans.*

14. $.03)$350.00.

11666.66\frac{2}{3}$. *Ans.*

15. $.07)$1200.00

17142.857\frac{1}{7}$. *Ans.*

ART. 255.

16, 17. Given.

18. $30)$100

$3\frac{1}{3}$ yrs. *Ans.*

19. $16\frac{2}{3}$ years.

20. $14\frac{2}{7}$ years.

21. 10 years.

COMPOUND INTEREST.—(p. 233.)

ART. 257.

1 Given.

2. $350.00 prin.

21.00 int. 1st yr.

$371.00 amt. 1 yr.

22.26 int. 2d yr.

$393.26 amt. 2 yrs.

23.595 int. 3d yr.

$416.855 amt. 3 yrs.

25.011 int. 4th yr.

$441.866 amt. 4 yrs.

$91.866. *Ans.*

3. $865.00 prin.

60.55 int. 1st yr.

$925.55 amt. 1 yr.

(car. for'd.)

(Brought for'd.)

$925.55 amt. 1 yr.

64.7885 int. 2d yr.

$990.3385 amt. 2 yrs

69.3236 int. 3d yr.

$1059.6621 amt. 3 yrs.

74.1763 int. 4th yr.

$1133.8384 amt. 4 yrs.

79.3686 int. 5th yr.

$1213.2070 amt. 5 yrs.

$348.207. *Ans.*

4. 250.00 prin.

12.50 int. 1st yr.

$262.50 amt. 1 yr.

13.125 int. 2d yr.

$275.625 amt. 2 yrs.

(car. for'd.)

Brought for'd.)
$275.625 amt. 2 yrs.
13.7812 int. 3d yr.
$289.4062 amt. 3 yrs.
14.4703 int. 4th yr.
$303.8765 amt. 4 yrs.
15.1938 int. 5th yr.
$319.0703 amt. 5 yrs.
15.9535 int. 6th yr.
$335.0238. *Ans.*

5. $1000.00 prin.
20.00, 1st int.
$1020.00, 1st amt.
20.40, 2d int.
$1040.40, 2d amt.
20.808, 3d int.
$1061.208, 3d amt.
21.2242, 4th int.
$1082.4322, 4th amt.
21.6486, 5th int.
$1104.0808, 5th amt.
22.0816, 6th int.
$1126.1624. *Ans.*

6. $1200.00 prin.
18.00, 1st int.
$1218.00, 1st amt.
18.27, 2d int.
$1236.27, 2d amt.
18.544, 3d int.
$1254.814, 3d amt.
18.8222, 4th int.
$1273.6362, 4th amt.
19.1045, 5th int.
$1292.7407, 5th amt.
(car. for'd.)

(Brought for'd.)
1292.7407, 5th amt.
19.3911, 6th int.
$1312.1318, 6th amt.
19.6819, 7th int.
$1331.8137, 7th amt.
19.9772, 8th int.
$1351.7909. *Ans.*

7. $800.00 prin.
20.00, 1st int.
$820.00, 1st amt.
20.50, 2d int.
$840.50, 2d amt.
21.0125, 3d int.
$861.5125, 3d amt.
21.5378, 4th int.
$883.0503, 4th amt.
22.0762, 5th int.
$905.1265, 5th amt.
22.6281, 6th int.
$927.7546. *Ans.*

8. $1500.00 prin.
105.00 int. 1st yr.
$1605.00 amt. 1 yr.
112.35 int. 2d y.
$1717.35 amt. 2 yrs.
120.2145 int. 3d yr.
$1837.5645 amt. 3 yrs.
128.6295 int. 4th yr.
$1966.1940 amt. 4 yrs.
137.6335 int. 5th yr
$2103.8275 amt. 5 yrs
36.8169 int. 3 mo.
2.4544 " 6 d.
$2143.0988 *Ans.*

ART. 258. (p. 234.)

10. Given.
11. $3195.818.
12. $26878.32.
13. $4964.817.
14. $560.361.
15. $261.687.
16. $1524.468.
17. $4297.963.

DISCOUNT.—(p. 236.)

ART. 260.

1, 2. Given.

3. $1.07)$475.00000
Ans. $443.925.

4. $1.14)$175.00000
Ans. $153.508+.

5. $1.02)$1000.00000
Ans. $980.392+.

6. $1.025)$750.000000
Pres. worth $731.707.
$750—$731.707=
$18.293+. *Ans.*

7. $1.075)$1800.000000
Ans. $1674.418+.

8. $1.0525)$1150.33000
Ans. $1092.95+

9. $1.035)$840.7500000
Pres. worth $812.3188+
Ans. $28.4312.

10. $1.01125)$2500.0000
Pres. worth $2472.1878+
Ans. $27.8122.

11. $1.01)$5000.0000
Ans. $4950.495+

12. $30.000 Int.
$28.302 Dis.
Ans. $1.698 Dif.

BANK DISCOUNT.—(p. 238.)

ART. 262. *a.*

14. $250.00 prin.
.07 rate.
3)$17.5000, 1 yr.
5.8333, 4 m.
.1458, 3 d.
$5.9791. *Ans.*

15. $375.00 prin.
.06 rate.
12)$22.5000, 1 yr.
10)$1.8750, 1 m.
.1875, 3 d.
$2.0625. *Ans.*

16. $1000.00 prin.
.05 rate.
6)$50.0000, 1 yr.
8.3333+, 2 m.
.4166+, 3 d.
$8.7499+. *Ans.*

17 $1160 prin.
.06 rate.
4)$69.60, 1 yr.
17.40, 3 m.
.58, 3 d.
$17.98 *Dis.*
$1142.02. *Ans.*

18. $750.3600 prin.
.04½ rate.
$33.766200, 1 yr.
14.069250, 5 m.
.281385, 3 d.
$14.350635 *Dis.*
$736.009365. *Ans.*

19. $1825.60 prin.
.023, $1 for t.
$41.98880. *Ans.*

20. $1292.00 prin.
.07 rate.
6)$90.4400, 1 yr.
15.0733+, 2 m.
.7536+, 3 d.
$15.8269+ *Dis.*
$1276.1731+. *Ans.*

21. $5000 prin.
.003, $1 for t.
$15.000 *Dis.*
$4985.00. *Ans.*

22. $15000 prin.
.001, $1 for t.
$15.000 *Dis.*
$14985. *Ans.*

23. $1326.00 prin.
.05½ rate.
$72.9300, 1 yr.
60.7750, 10 m.
.6077, 3 d.
$61.3827 *Dis.*
$1264.6173. *Ans.*

24. $836.81 prin.
.07 rate.
4)$58.5767, 1 yr
14.64417, 3 m.
.48813, 3 d.
$15.13230. *Ans.*

25. $1261.38 prin.
.08 rate.
6)$100.9104, 1 yr.
13.8184, 2 m.
.8409, 3 d.
$17.6593. *Ans.*

26. $10000 prin.
.06½ rate.
12)$650.00, 1 yr.
54.1666+, 1 m.
5.4166+, 3 d.
$59.5832. *Ans.*

27. $1000 prin.
.30 $1 for t.
$300.00 bank dis.
1.30)$1000.00000
Pres. worth $769.2307.
$1000.0000 prin.
769.2307 pres. worth.
$230.7693 true dis.
300.000 bank dis.
230.769 true dis.
Ans. $69.231 dif.

28. $100000 prin.
.07 rate.
$7000.00 bank dis.
1.07)$100000.000000
Pres. w. $93457.9439
$100000.0000 prin.
93457.9439 pres. w.
$6542.0561 true dis.
7000.000 bank dis.
6542.056 true dis
Ans. $457.944 dif.

INSURANCE.—(p. 240.)

Art. **264.**

1. Given.
2. $6.5625.
3. $12.50.
4. $143.375.
5. $27.30.
6. $81.25.
7. $206.25.
8. $202.666.
9. $150.
10. $45.18.
11. $58.80.
12. $1950.
13. $573.75.
14. $2390.
15. $4205.

Art. **264.** *a.* (p. 242.)

16. Given.

17. .015)$250.000
Ans. $16666.666.

18. .022)$1200.000
Ans. $54545.4545 +.

Art. **265.**

19. Given.

20. 5000)$40.000
.008
Ans. $\frac{8}{10}$, or $\frac{4}{5}$ of 1 pr. ct
(See Art. 223, Obs. 3.)

21. $\frac{5}{10}$, or $\frac{1}{2}$ of 1 per cent.

22. 7 per cent.

Art. **265.** *a.* (p. 243.)

23. Given.

24. $1—.08=$.92
.92)$6250.00000
Ans. $6793.478.

25. $1—.05=$.95
.95)$11250.00000
Ans. 11842.105.

PROFIT AND LOSS.—(p. 244.)

ART. 267.

1. Given.

2. $60 cost.
.10, per ct.
$6.00. *Ans.*

3. $5.79.
4. $43.
5. $56.25.
6. $250.

ART. 268. (p. 245.)

7, 8 Given.

9 $22.75 cost.
.15, per ct.
11375
2275
$3.4125 gain.
$26.1625. *Ans.*

10. $37.50 cost.
.18, per ct.
$6.75 gain.
$44.25. *Ans.*

11. $89.33 cost.
.20, per ct.
$17.866 loss.
$71.464. *Ans.*

12. *Note.*—25 per ct.=$\frac{1}{4}$ of 100; hence the gain is equal to $\frac{1}{4}$ the cost.—(Art. 267. Obs.)
4)$275.00 cost.
$68.75 gain.
$343.75. *Ans.*

13. $367.13 cost.
.15, per ct.
$55.0695 loss.
$312.0605. *Ans.*

14. $875.00 cost.
.33, per ct.
$288.75 gain.
$1163.75. *Ans.*

15. $30000 cost.
$.02\frac{1}{2}$, per ct.
$750.00 loss.
$29250. *Ans.*

ART. 269. (p. 246.)

16. Given.

17. $3.25 selling p.
2.75 cost.
$ .50 gain.
2.75).5000
Ans. $18\frac{2}{11}$ per ct

18. $.30 selling p.
.20 cost.
.10 gain.
.20).1000
Ans. 50 per ct.

19. $.075 selling p.
.06 cost.
.015 gain.
.06).0150
Ans. 25 per ct.

20. $.12 selling p.
.09 cost.
.09).03 gain.
Ans. $33\frac{1}{3}$ per ct.

21. $6.00 selling p.
4.50 cost.
$1.50 gain.
4.50)1.500
Ans. $33\frac{1}{3}$ per ct.

22. $73 cost.
$68 selling p.
$5 loss.
$73)$5.00
Ans. $6\frac{62}{73}$ per ct.

23. $155.63 cost.
148.28 selling p.
$7.35 loss.
$155.63)$7.3500
Ans. $4\frac{11248}{15563}$ per ct.

24. $3500)$150.00
Ans. $4\frac{2}{7}$ per ct.

25. $10000 selling p.
7500 cost.
$2500 gain.
$7500)$2500.00
Ans. $33\frac{1}{3}$ per ct.

26. $1365 selling p.
1175 cost.
$190 gain.
$1175)$190.00
Ans. $16\frac{8}{47}$ per ct.

27. $12362 selling p.
10000 cost.
$2362 gain.
10000)2362.00
Ans. $23\frac{31}{50}$ per ct.

ART. **270.** (p. 248.)

28, 29. Given.

30. $1.20)$24.00
Ans. $20.

31. $.90)$85.00
Ans. 9.44\frac{4}{9}$.

32. $1.15)$125.000000
Ans. $108.6956

33. $1.12)$200.00
Ans. 178.57\frac{1}{7}$

34. $1.50)$560.0000
Ans. 373.33\frac{1}{3}$.

35. $.875)$1500.000
$1714.285.

EXAMPLES FOR PRACTICE.—(p. 249.)

1. $45 cost.
.10, per ct.
$4.50 gain.
25)49.50 cost and gain.
$1.98. *Ans.*

2. $.07 selling p.
.06 cost.
.01 gain per yd.
.06).0100
$16\frac{2}{3}$ per ct.
$.01 × 40 = $.40 *gain.*

3. $.30 selling p.
.25 cost.
.05 gain per yd.
.25).0500
20 per ct.
$.05 × 60 = $3.00 *gain.*

4. $.375 selling p.
.315 cost.
.06 gain per b.
.315).06000
$19\frac{1}{21}$ per ct.
$.06 × 100 = $6.00 *gain.*

5. $350 cost.
.15, per ct.
$52.50 gain.
175)$402.50 cost and g.
$2.30. *Ans.*

6. $2500 cost.
.08, per ct.
$200.00 loss.
480)$2300.00 selling p.
$\$4.79\frac{1}{6}$. *Ans.*

7. 30 yds. × 10 = 300 yds.
$1400 cost.
.20, per ct.
$280.00 gain.
300)$1680.00 cost and g.
$5.60. *Ans.*

8. $75 cost.
.07 per ct.
$5.25 loss.
500)$69.75 cost—loss.
$0.1395. *Ans.*

9. 63 gal. × 12 = 756 gal.
$.25 cost.
.20, per ct.
.0500 gain per gal.
30 cts. *selling price.*
$.05 × 756 = $37.80 *profit*

10. $675 cost.
.18, per ct.
$121.50 gain.
750)$796.50 cost and g.
Ans. $1.062 per bu.

11. $10.25 per bbl.
1500 bbls.
$15375.00 cost.
.09 per ct.
$1383.7500 loss.
1500)$13991.25 cost—loss
Ans. $9.3275 per bbl.

12. $.50 selling p.
.25 cost.
.25)$.25 gain per bu.
100 *per cent.*
$.25 × 150 = $37.50 *gain.*

13. $.75 × 500 = $375 cost.
$375
.20 per ct.
$75.00 gain.
$450.00. *Ans.*

14. $.625 cost per lb.
.10, per ct.
.06250 loss per lb.
$.5625. *Ans.*

15. $75 cost.
.20, per ct.
$15.00 gain.
750)$90.00 cost and g.
$.12 per yd.
75÷750=.10 cost per yd.
$.02 gain per yd.

Or, 750)$75.00
cost per yd. $.10
per cent. .20
gain .02
selling p. 12 cts.

16. $.84 cost.
.20, per ct.
.1680 gain.
$1.008. *Ans.*

17. $.30 cost.
.50, per ct.
.1500 gain per yd.
$.45. *Ans.*

18. Cost, $350.00
$.06 × 5000= 300.00
Loss, $50.00
$350)$50.00
Ans. $14\frac{2}{7}$ per ct.

19. $1635)$350.00
Ans. $21\frac{133}{327}$ pr. ct.

20. 4)$12500
$3125 loss.
10000)$9375.0000
Ans. $.9375 per a.

21. 1.125)$6.500000
Cost per b. $5.7777
per ct. .12$\frac{1}{2}$
Loss per b. $.722212
$5.7777 cost.
.7222 loss.
$5.0555 selling p
116
$586.4380. *Ans.*

Or, 116×6\frac{1}{2}$=$754.
1.125)754.000
Cost, $670.2222
per ct. .125
83.7777750 loss.
$670.2222 cost.
83.7777 loss
$586.4445. *Ans.*

22. 1.15)$5.375000
Cost, $4.6739
$5.250
4.674
4.674) .576000
Ans. 12.3 per ct.

23. 516×.75=$387.00 cost
$387×.07= 27.09 int.
$414.09 inv.

516×.01$\frac{1}{2}$=7.74 yds.
516−7.74=508.26 yd. left
.75×.20=$.15 advance.
.75+.15=$.90 selling p.
508.26×.90=$457.434
Investment, $414.090
Ans. $43.344 g

DUTIES.—(p. 251.)

ART. 272. *a.*

2. 561 lbs.
473 "
378 "
493 "
1905 lbs. gross.
64 " tare.
1841 lbs. net. *Ans.*

3. 12×5= 60 cwt.
60×112=6720 lbs. gross.
27×12= 324 lbs. tare.
Ans. 6396 lbs. net.

4. 341×21=7161 lbs.
17×21= 357 " tare.
Ans. 6804 lbs. net.

5. 15 T. 12 cwt. 2 qrs. 20 lbs.=
312.678 cwt. gross.
312.678 cwt.×5½=
1719.729 lbs.
Ans. 1720 lbs. draft and t.

6. 27 T. 16 cwt. 3 qrs. 15 lbs.=
556.8839 cwt. gross.
556.8839 cwt.×7¼=
4037.4082 lbs.
Ans. 4037 lbs. draft and t.

7 41 hhds. 45 g.=2628 gals.
2628×.02=52.56 gals. or
53 gals. leakage.
2628−53=2575 g. net.
Ans.

8. 35 g.-3 q.×64=2288 gals.
2288×.03½=80 gals. lkg.
2288−80=2208 gal. net.
Ans.

9. 423×.10=42 bot. bkge.
423−42=381 bot. net.
Ans.

10. 65×16=1040 bottles.
1040×.05=52 bot. bkg.
1040−52=988 bot. net.
Ans.

ART. 273. (p. 253.)

1, 2. Given.
3. $87.75.
4. $202.50.
5. $941.60.

6. 200 lbs.×300=60000 lbs.
4 per ct. of 60000 lbs.=
2400 lbs.;
60000−2400=57600 lbs.
57600×.15=$8640. *Ans.*

ART 274. (p. 254.)

7. Given.
8. $75.
9. $71.224.
10. $131.6525.
11. $90.03.
12. $69.0375.
13. $186.4625.
14. $850.
15. $1000.
16. $1695.
17. $1504.80.
18. $2898.
19. $3592.75.
20. $4500.375.
21. $2819.125.

22. 25264 lbs.×.06¼=$1579
$1579×.12½ (per ct.)=
$197.375. *Ans.*

23. £3256×.27=£879.12,
£879.12×$4.84=
$4254.9408. *Ans.*

24. 16s. 6d.×650=10725s.
10725÷20=£536.25,
£536.25×.34 (per ct.)=
£182.325,
£182.325×$4.84=
$882.453. *Ans.*

ASSESSMENT OF TAXES.—(p. 256.)

Art. 278.

1, 2. Given.

3. $12.25.

4. $15000)$750.00
Tax on $1, 5 cts.
$1150 prop.
.05, per ct.
Tax, $57.50. *Ans.*

5. $1530 prop.
.05, per ct.
B's tax, $76.50. *Ans.*

6. Whole tax, $14752.50
Poll " 3495.00
Prop. " $11257.50
$562875)$11257.50
Tax on $1, 2 cts.
$5000×.02=$100.00 prop.
$0.60×4= 2.40 poll.
C's tax, $102.40.

7. $3500×.02=$70.00 prop.
0.60×2= 1.20 poll.
D's tax, $71.20.

8. $15300×.02=$306.00
$0.60×5= 3.00
G's tax, $309.00.

Art. 279. (p. 258.)

9, 10. Given.

Note.—B's tax and that of C. D., &c., down to Ex. 22, may be found by the table made for Ex. 9; or by multiplying the amount of property by the per cent., according to the general rule. (Art. 277.)

11. $1461×.02=$29.22
$0.25×4= 1.00
B's tax, $30.22

12. $117.51 C's tax.
13. $159.47 D's tax.
14. $285.22 E's tax.
15. $510.50 F's tax.
16. $405.25 G's tax.
17. $307.70 H's tax.
18. $661 J's tax.
19. $300.51 K's tax.
20. $90.75 L's tax.
21. $612.25 M's tax.

22. Whole tax=$5312.50
1550×$1¼=$1937.50
450000)3375.0000
Tax on $1, .0075
$1149+$1376=$2525,
$2525×.0075=$18.9375
$1.25×3= 3.75
Ans. $22.6875

23. \$2175+\$960=\$3135,
\$3135×.0075=\$23.5125
Poll tax, 1.25
B's tax, \$24.7625

24. \$1318 pers. prop.
\$1263 real estate.
2581 C's prop.
.0075 tax on \$1.
\$19.3575 prop. tax.
(car. for'd.)

(Brought for'd.)
\$19.3575 prop. tax.
2.50 poll tax.
\$21.8575 C's tax.

25. \$1538×\$1681=\$3219,
\$3219×.0075=\$24.1425
Poll tax, 2.50
B's tax, \$26.6425

PROPERTIES OF NUMBERS.

ART. 286. (p. 263.)

1. Given.
2. 27 cows.
3. 185 acres.

ART. 287.

4. Given.
5. \$36.
6. 387 sheep.

ART. 289.

7. Given.
8. 24 years.
9. 1050 fem.

ART. 290. (p. 264.)

10. Given.
11. 10 years; 15 years.
12. \$36 tea; \$27 molasses.

ART. 291.

13. Given.
14. 10 years.
15. 8 rods.

ART. 292.

16. Given.
17. \$825.
18. 1350 apples.

ART. 293.

19. Given.
20. 12 sailors
21. 8 flocks

ART. 294.

22. Given.
23. 7 years.
24. 12 marbles.

ANALYSIS.

ART. **296.** (p. 270.)

1. Given.

2. *Analysis.*—If 30 cows cost $360.90, 1 cow will cost $\frac{1}{30}$ of $360.90, or $12.03. Now if 1 cow cost $12.03, 47 cows will cost 47 times as much, or $565.41. Therefore, if 30 cows cost $360.90, 47 cows will cost $565.41.

Operation.
30)360.90
12.03
47
8421
4812
$565.41. *Ans.*

3. $15.00÷25=
$.60 cost, 1 bbl.
.60×37=$22.20. *Ans.*

4. $450÷15=$30, cost 1 h.
$30×21=$630. *Ans.*

5. $127÷31=$4.0967+
per yd.
$4.0967×89=
$364.61+. *Ans.*

6 $660.00÷55=
$12.00 per ton,
$12×17=$204. *Ans.*

7. $159.00÷530=.30 pr.lb.
.30×100=$30.00. *Ans.*

8. $76.80÷30=$2.56 pr. c.
$2.56×65=$166.40.
Ans.

9. $106.25÷85=$1.25 pr.y.
$1.25×38=$47.50. *Ans.*

10. $525.00÷350=
$1.50 apiece,
$1.50×65=$97.50. *Ans.*

11. $1.25÷12.5=.10 per lb.
.10×45=$4.50. *Ans.*

12. $8.00÷16.5=.4848+
$.4848×25=$12.12.
Ans.

13. $20.00÷60=$.33$\frac{1}{3}$ pr.lb.
12$\frac{1}{2}$×$.33$\frac{1}{8}$=$4.16$\frac{2}{3}$
Ans.

14. $16.40÷41=$.40 pr.yd.
$.40×8$\frac{3}{5}$=$3.44. *Ans.*

15. $4.50÷18=$.25 pr. lb.
$.25×10$\frac{3}{5}$=$2.65. *Ans.*

16. 84÷12=7 m. pr. hour,
15$\frac{1}{2}$×7=108$\frac{1}{2}$ m. *Ans.*

17. 72÷16=4$\frac{1}{2}$ bu. apiece,
25×4$\frac{1}{2}$=112$\frac{1}{2}$ bu. *Ans.*

18. 120÷5=24 m. pr. hour,
24×12$\frac{3}{4}$=306 m. *Ans.*

19. 180÷12=15 m. pr. hour,
15×5$\frac{3}{8}$=80$\frac{5}{8}$ m. *Ans.*

20. Given.

21. Since 1 bbl. lasts 18 men 72 days, it will last 1 man 18 times 72 days, or 1296 days.

Again, if 1 bbl. lasts 1 man 1296 days, it will last 27 men $\frac{1}{27}$ of 1296 days, or 48 days. Therefore, if 18 men eat a bbl. of flour in 72 days, 27 men will eat it in 48 days.

Operation
72
18
576
72
27)1296
Ans. 48 days.

22. $96 \times 90 = 8640$ d. 1 horse,
$8640 \div 45 = 192$ d. *Ans.*

23. $180 \times 36 = 6480$ d. 1 man,
$6480 \div 120 = 54$ d. *Ans.*

24. $45 \times 20 = 900$ mo. 1 m.
$900 \div 28 = 32\frac{1}{7}$ mo. *Ans.*

25. $120 \times 60 = 7200$ d.
$7200 \div 25 = 288$ d. *Ans.*

26. $\$.30 \div 3 = \$.10$, cost $\frac{1}{3}$ bu.
$\$.10 \times 7 = \$.70$. *Ans.*

27. $\$7.00 \div 5 = \$1.40$, cost $\frac{1}{5}$ T.
$\$1.40 \times 3 = \$4.20$. *Ans.*

28. $\$.27 \div 3 = \$.09$, cost $\frac{1}{3}$ lb.
$\$.09 \times 4 = \$.36$. *Ans.*

29. $\$2.61 \div 3 = \$.87$, cost $\frac{1}{7}$ T.
$\$.87 \times 6 = \$5.22$. *Ans.*

30. Given.

31. $\$1.80 \div 4 = \$.45$, cost $\frac{1}{5}$ c.
$\$.45 \times 5 = \$2.25$ pr. cord,
$\$2.25 \div 7 = \$.32\frac{1}{7}$, cost $\frac{1}{7}$c.
$\$.32\frac{1}{7} \times 3 = \$.96\frac{3}{7}$. *Ans.*

32 $14 \div 2 = 7$s., cost $\frac{1}{9}$ yd.
$7\text{s.} \times 9 = 63$s. pr. yd.
$63 \div 4 = 15\frac{3}{4}$s., cost $\frac{1}{4}$ yd.
$15\frac{3}{4} \times 3 = 47\frac{1}{4}$s. *Ans.*

33. $\$56 \div 7 = \$8$, cost $\frac{1}{8}$ A.
$\$8 \times 8 = \$64$ pr. acre,
$\$64 \div 5 = \$12.80$, for $\frac{1}{5}$ A.
$\$12.80 \times 2 = \$25.60$. *Ans.*

34. $\$28 \div 7 = \$4$ pr. bbl.
$\$4 \div 4 = \$1$, cost $\frac{1}{4}$ bbl.
$\$1 \times 3 = \$3$. *Ans.*

35. $56 \div 4 = 14$lbs. $= \frac{1}{4}$ fir.
$14 \times 3 = 42$ lbs. $= \frac{3}{4}$ fir.
$\$8\frac{2}{5} \div 42 = \$.20$. *Ans.*

36. $\$5.50 \div 6.25 = \$.88$ pr. bu.
$\$.88 \times 20\frac{1}{2} = \$18.04$. *Ans.*

37. $\$47 \div 23\frac{1}{2} = \$2$ pr. rod,
$\$2 \times 42\frac{3}{4} = \$85.50$. *Ans.*

38. $\$45.42 \div 36\frac{2}{5} =$
$\$1.2478$ pr. rod,
$\$1.2478 \times 60.7 =$
$\$75.74+$. *Ans.*

39. $\frac{20}{100} \div 4 = \frac{5}{100} = \$.05$pr. lb.
$\$.05 \times 20 = \$1.00$. *Ans.*

41. $\$3\frac{6}{8} = \$3.75$,
$\$3.75 \div 20 = \$.18\frac{3}{4}$ pr. lb.
$\$.18\frac{3}{4} \times 168 = \$31.50$.
Ans.

42. $\$4.50 \div 30 = \$.15$ pr. yd.
$\$.15 \times 19 = \$2.85$. *Ans.*

44. $£\frac{6}{7} \div \frac{3}{4} = £\frac{24}{21}$, cost 1 yd.
$£\frac{24}{21} \times \frac{7}{8} = £\frac{168}{168}$, or £1.
Ans.

45. $\$16000 \div 3 =$
$\$5333\frac{1}{3}$, cost of $\frac{1}{16}$ s.
$\frac{5}{8} = \frac{10}{16}$,
$\$5333\frac{1}{3} \times 10 = \$53333\frac{1}{3}$.
Ans.

46. $\$63 \div .9 = \$70$ pr. A.
$\$70 \div 3 = \$23\frac{1}{3} = \frac{1}{4}$ cost,
$\$23\frac{1}{3} \times 4 = \$93\frac{1}{3}$. *Ans.*

47. $\$\frac{75}{8} \div \$\frac{15}{2} = \$\frac{150}{120}$ pr. yd.
$\$\frac{150}{120} \times \frac{37}{2} = \frac{5550}{240}$, or
$\$23.125$. *Ans.*

48. $30 \times 2\frac{1}{2} = 75$ lbs. pr. d.
$4500 \div 75 = 60$ d. *Ans.*

49. $756 \times \frac{3}{4} = 567$ lbs. pr. d.
$56700 \div 567 = 100$ d. *Ans.*

50. $756 \times 1\frac{1}{2} = 1134$ lbs. pr. d.
$56700 \div 1134 = 50$ d.
Ans.

ART. **297.** (p. 274.)

52. 32s. 6d. × 64 = 2080s.
2080s. ÷ $3\frac{1}{3}$s. = 624 bu.
Ans.

53. $50 \times \$.12\frac{1}{2} = \$6.25$,
$\$6.25 \div \$3.12\frac{1}{2} = 2$ cords.
Ans.

54 6s. 4d. × 135 = 855s.
855s. ÷ $3\frac{3}{4}$s. = 228 pair.
Ans.

55. $186 \times \$.18\frac{3}{4} = \$34.87\frac{1}{2}$,
$\$34.87\frac{1}{2} \div \$.175 =$
$199\frac{2}{7}$ lbs. *Ans.*

56. $256 \times \$.06\frac{1}{4} = \$16.00$,
$\$16.00 \div \$.16\frac{1}{4} =$
$98\frac{6}{13}$ lbs. *Ans.*

57. $325 \times \$2\frac{1}{4} = \$731\frac{1}{4}$,
$\$731\frac{1}{4} \div 10\frac{1}{2} = 69\frac{9}{14}$ T.
Ans.

58. $63 \times \$.37\frac{1}{2} = \$23.62\frac{1}{2}$,
$\$23.62\frac{1}{2} \div 331\frac{1}{2} =$
$\$.07\frac{28}{221}$. *Ans.*

59. $74 \times \$.42\frac{1}{2} = \$31.45$,
$\$31.45 \div \$.25 = 125.8$ bu.
Ans.

60. $\$.87\frac{1}{2} \times 400 = \$350.00$,
$\$350.00 \div 700 = \$.50$.
Ans.

61. 249.5
5.25
1.75)1309.875
Ans. 748.5 yds.

62. 19 cwt. 2 qrs. 15 lbs. =
19.65 cwt.
9.50
.075)186.6750
Ans. 2489 lbs.

63. $263\frac{3}{4}$
1.75
9.5)461.5625
Ans. 48.585 cwt.

64. 125 hhd. 22 gals. 3 qts. =
7897.75 gals.
.375
.625)2961.65625
Ans. 4738.65 lbs.

65. .778125 T. =
1556.25 lbs.
4.5
5.875)7003.125
Ans. 1192.021 yds.

66. .45683 A.
160
73.09280 r.
$272\frac{1}{4}$
19899.5148 sq. ft.
.75
3.6)14924.6361
Ans. 4145.73225 cords.

67. 45 T. 15 cwt. 20 lbs.=
45.76 T.
$7\frac{1}{2}$
6.25)343.20
Ans. 54.912 bbls.

68. £12, 8s.=248s.
$5\frac{1}{3}$)248
Ans. 46.5 yds.

69. $2.25
432
450
675
900
144)972.00
Ans. $6.75 per bbl.

70. If 15 yds. flannel are worth 25 yds. muslin, 1 yd. flannel is worth $\frac{1}{15}$ of 25 yds., or $1\frac{2}{3}$ yds. muslin. Now $1\frac{2}{3}$ yd. muslin will buy 1 yd. flannel, 15 yds. muslin will buy as many yds. flannel as $1\frac{2}{3}$ is contained times in 15. And $15 \div 1\frac{2}{3} = 9$. Therefore 9 yds. flannel are worth 15 yds. muslin.

Operation.
15)25
$1\frac{2}{3}$
$1\frac{2}{3}$)15
9 yds. *Ans*

71. 10 doz.=120 oranges. Since she got 3 oranges for 4 cts., she paid as many times 4 cts. for them as 3 is contained times in 120. Now $120 \div 3 = 40$, and $40 \times 4 = 160$. She therefore paid 160 cts. for 120 oranges. Again, since she exchanged the oranges for eggs at the rate of 4 for 5 cts., she must have got as many times 4 eggs as 5 cts. are contained times in 160 cts. which is 32, and $32 \times 4 = 128$. She therefore received 128 eggs for 10 doz. oranges.

Operation.
3)120
40
4
5)160
32
4
128 eggs. *Ans.*

72. Since 15 lbs. pepper are worth 25 lbs. ginger, 195 lbs. pepper are worth as many times 25 lbs ginger as 15 is contained times 195. Now $195 \div 15 = 13$, and $13 \times 25 = 325$. 195 lbs. pepper are therefore worth 325 lbs. ginger.

Operation.
15)195
13
25
325 lbs. *Ans*

73. Since 5 men are worth 11 boys, 145 men are worth as many times 11 boys, as 5 is contained times in 145. Now 145÷5=29, and 29×11=319. Therefore, it will require 319 boys to earn as much as 145 men.

Operation.

5)145
29
11
319 boys. *Ans*

74. 175 T. 10 cwt. 15 lbs.=
3510.15 cwt.
3510.15 cwt.×$2.25=
$7897.8375.
$7.50)7897.8375
Ans. 1053.045 cwt. cot.

75. $17\text{ c. }10\frac{1}{2}\text{ lbs}=1710\frac{1}{2}\text{ lbs.}$
$1710\frac{1}{2}\times.06\frac{1}{4}=$
$\$106.90625.$
$\$106.90625\div.105=$
1018.154 lbs. *Ans.*

ART. **298.** (p. 276.)

76. Given.

77. $400+$500=$900 cap.
$300.00÷$900=
$\$.33\frac{1}{3}\text{ on }\$1;$
$\$400\times\$.33\frac{1}{3}=$
$\$33.33\frac{1}{3}\text{, A's share,}$
$\$500\times\$.33\frac{1}{3}=$
$\$166.66\frac{2}{3}\text{, B's share.}$

78. $75+$60+$40=
$175, amt. of rent.
$250\div175=1\frac{3}{7}\text{ bu. to }\$1;$
$75\times1\frac{3}{7}=107\frac{1}{7}\text{ bu., A's,}$
$60\times1\frac{3}{7}=85\frac{5}{7}\text{ bu., B's,}$
$40\times1\frac{3}{7}=57\frac{1}{7}\text{ bu., C's.}$

79. $400+$250+$350=
$1000, amt. paid.
$1500÷$1000=
$1.50, sum paid on $1;
$1.50×400=$600, A's,
$1.50×250=$375, B's,
$1.50×350=$525, C's.

80. $10000+$12000+
$15000+$8000=
$45000 cost.
$3000\div45000=\frac{3000}{45000}\text{, or}$
$\frac{1}{15}\text{ bbl. to }\$1;$
$10000\times\frac{1}{15}=666\frac{2}{3}\text{, A's,}$
$12000\times\frac{1}{15}=800\text{, B's,}$
$15000\times\frac{1}{15}=1000\text{, C's,}$
$8000\times\frac{1}{15}=533\frac{1}{3}\text{, D's.}$

81. $900+$1500+$1200=
$3600, capital.
$1260÷$3600=
$.35 on $1;
$.35×900=$315, A's,
$.35×1500=$525, B's,
$.35×1200=$420, C's.

82. $20000−$12000=
$8000, Z's stock.
$5000÷$20000=
$.25 on $1;
$.25×5000=$1250, X's,
$.25×7000=$1750, Y's,
$.25×8000=$2000, Z's.

83. $300+$400+$500=
$1200, amt. of debts.
$800÷$1200=
$\$.66\frac{2}{3}\text{, sum paid on }\$1;$
$\$.66\frac{2}{3}\times300=\$200\text{, 1st,}$
$\$.66\frac{2}{3}\times400=\$266.66\frac{2}{3}\text{, 2d,}$
$\$.66\frac{2}{3}\times500=\$333.33\frac{1}{3}\text{, 3d.}$

ART. **299.** (p. 277.)

84. \$1600÷\$2000=\$.80, sum paid on \$1. *Ans.*

85. \$156.45+\$256.40+\$360.40=\$773.25, amt. of debts.
\$773.25)\$317.0000
$\$.40\frac{3080}{3093}$, sum paid on \$1.
$\$.40\frac{3080}{3093}\times 156.45=\$64.1379\frac{753}{3093}$, A's share,
$\$.40\frac{3080}{3093}\times 256.40=\$105.1132\frac{724}{3093}$, B's "
$\$.40\frac{3080}{3093}\times 360.40=\$147.7488\frac{1616}{3093}$, C's "

86 \$3560÷\$35600=\$.10, on \$1;
\$5000×\$.10=\$500. *Ans.*

87. \$2350÷\$55645=\$.042+, sum paid on \$1. *Ans.*

88. $\$6540\div\$56000=\$.11\frac{19}{28}$, sum paid on \$1. *Ans.*

ART. **300.**

89. 600+400+200=1200 bbls.
$200\div1200=.16\frac{2}{3}$, loss per bbl.
$600\times.16\frac{2}{3}=100$ bbls., A's loss,
$400\times.16\frac{2}{3}=66\frac{2}{3}$ bbls., B's "
$200\times.16\frac{2}{3}=33\frac{1}{3}$ bbls., C's "

90. \$72000+\$28000=\$100000, ship and cargo
\$10000÷\$100000=.10, the per cent.
\$15000×.10=\$1500, A's loss.

91. \$85265+\$17000=\$102265, vessel and cargo.
$\$15500\div\$102265=.15\frac{3205}{20453}$, the per cent.
\$17000÷4=\$4250, master's interest in vessel.
$\$4250\times.15\frac{3205}{20453}=\$644.15\frac{20005}{20453}$, master's loss.

92—94. Given.

95. 50 lbs. at 4s.=200s.
100 lbs. at 7s.=700s.
150 lbs. 900s.
900s.÷150=6s. per pound. *Ans.*

96. 30 qts. water.
120 qts. at 5 cts.=\$6.00.
150)\$6.00
\$.04 a quart. *Ans.*

97. 30 bu. at 25 cts.=\$7.50, value of oats,
10 bu. at 75 cts.=\$7.50, value of peas,
15 bu. at 50 cts.=\$7.50, value of corn,
55 bu. \$22.50, value of mixture.
\$22.50÷55=\$.40$\frac{10}{11}$ per bu. *Ans.*

98. 60 gals. at \$.31$\frac{1}{4}$=\$18.75, value of whale oil,
85 gals. at \$.90 =\$76.50, value of sperm "
145 gals. \$95.25, value of mixture.
\$95.25÷145=\$.65$\frac{20}{29}$ per gal. *Ans.*

99. 112 lbs. at 6 cts. =\$ 6.72, 1st kind,
150 lbs. at 8 cts. =\$12.00, 2d "
175 lbs. at 12 cts.=\$21.00, 3d "
437 lbs. \$39.72, value of mixture.
\$39.72÷437=\$.09$\frac{39}{437}$ per lb. *Ans.*

100. 10 oz. at 20 car.=200 carats fine,
8 oz. at 22 car.=176 " "
4 oz. alloy =000
22 oz. 376 carats fine.
376÷22=17$\frac{1}{11}$ car. fine. *Ans.*

101. Given.

102. 1 man will reap 6 acres in 6 days, or 1 acre in 1 day. Now if 1 acre requires 1 man 1 day, 100 acres will require 100 men 1 day. And since to reap 100 acres in 1 day requires 100 men, to reap them in 5 days will require $\frac{1}{5}$ as many, and $\frac{1}{5}$ of 100 is 20.
Ans. 20 men.

103. 14×3=42 d., time 1 man can build 84 rods,
84 r.÷42=2 r. per day,
300÷2=150 d., time 1 man can build 300 rods.
150÷20=7$\frac{1}{2}$ days. *Ans.*

104. 75×3=225 mo., time 1000 bbls. will support 1 man,
1000÷225=4$\frac{4}{9}$ bbls. per month,
3000÷4$\frac{4}{9}$=675 mo., time 3000 bbls. will sup. 1 m.
675÷300=2$\frac{1}{4}$ mo. *Ans.*

105. 320÷80=4 miles per hour,
15×12=180 hours,
180×4=720 miles. *Ans.*

106. $126 \div 24 = 5\frac{1}{4}$ bu. 1 h. eats in 36 d.
$5\frac{1}{4} \div 36 = \frac{7}{48}$ bu. 1 h. eats per d.
$\frac{7}{48} \times 32 = 4\frac{2}{3}$ bu. 32 h. eat per d.
$4\frac{2}{3} \times 48 = 224$ bu. in 48 d. *Ans.*

ART. **302.** (p. 281.)

107. Given.

108. $\frac{1}{2}+\frac{1}{5}=\frac{7}{10}$; and $\frac{10}{10}-\frac{7}{10}=\frac{3}{10}$. Hence, 72 is $\frac{3}{10}$ of his sheep. Now if 72 is $\frac{3}{10}$, $\frac{1}{10}$ is $\frac{1}{3}$ of 72, which is 24, and $\frac{10}{10}$ is 240. *Ans.* 240 sheep.

109. $\frac{1}{2}+\frac{1}{3}=\frac{5}{6}$,
$\frac{1}{6}=\$48$,
$\frac{6}{6}=\$288$. *Ans.*

110. $\frac{1}{6}+\frac{1}{8}+\frac{1}{12}=\frac{9}{24}$,
$\frac{15}{24}=900$ men,
$\frac{1}{24}=60$;
$\frac{24}{24}=1440$ men. *Ans.*

111 $\frac{1}{3}+\frac{1}{4}=\frac{7}{12}$,
$\frac{7}{12}=84$,
$\frac{1}{12}=12$;
$\frac{12}{12}=144$. *Ans.*

112. $\frac{1}{2}+\frac{1}{3}=\frac{5}{6}$,
$\frac{6}{6}+\frac{5}{6}=\frac{11}{6}=110$,
$\frac{1}{6}=10$;
$\frac{6}{6}=60$. *Ans.*

113. $\frac{1}{3}+\frac{1}{4}=\frac{7}{12}$,
$\frac{12}{12}-\frac{7}{12}=\frac{5}{12}=10$ ft.
$\frac{1}{12}=2$ ft.;
$\frac{12}{12}=24$ ft. *Ans.*

114. If \$85 is $\frac{5}{8}$ the price, $\frac{1}{8}$ is $\frac{1}{5}$ of \$85, or \$17, and $\frac{8}{8}=\$136$. *Ans.*

115. $\$2700 \div 3 = \$900$, cost $\frac{1}{16}$
$\$900 \times 16 = \$14400$. *Ans*

116. $\frac{1}{3}+\frac{1}{4}=\frac{7}{12}$,
$\frac{5}{12}=30$ yrs.
$\frac{1}{12}=6$ yrs.
$\frac{12}{12}=72$ yrs. *Ans.*

117. $\frac{7}{8}-\frac{2}{3}=\frac{5}{24}=10$,
$\frac{1}{24}=2$,
$\frac{24}{24}=48$. *Ans.*

118. $\frac{1}{3}+\frac{1}{4}+\frac{1}{6}=\frac{18}{24}$,
$\frac{6}{24}=18$,
$\frac{1}{24}=3$;
$\frac{24}{24}=72$ scholars.

119. $\frac{1}{8}-\frac{1}{12}=\frac{1}{24}=\$650$,
$\frac{24}{24}=\$15600$. *Ans.*

120. $\frac{1}{3}+\frac{1}{4}+\frac{1}{6}=\frac{9}{12}$;
$\frac{3}{12}=15$; $\frac{1}{12}=5$;
$\frac{12}{12}=60$ trees. *Ans.*

121. Given.

122. $680 \times £\frac{1}{2} = £340$. *Ans.*

ART. **303.** (p. 282.)

123. Given.

124. 25 cts. $=\frac{1}{4}$ doll. 4)1268
Ans. \$317

125. $6\frac{1}{4}$ cts. $=\frac{1}{16}$ doll. 8)480
2)60
Ans. \$30

126. $33\frac{1}{3}$ cts. $=\frac{1}{3}$ doll. 3)750
Ans. \$250

127. $66\frac{2}{3}$ cts. $=\frac{2}{3}$ doll. 3)360
120
2
Ans. \$240

128. $37\frac{1}{2}$ cts.$=\frac{3}{8}$ doll.
8)1564
195.5
3
$586.50. *Ans.*

Or, 4)1564
2)391
195.5
$586.50.

129. $1218.75. *Ans.*

130. $1814.40. *Ans.*

132. 2 | 350, at £1,
20 | 175, at 10s.
8.75, at 6d.
Ans. £183.75=£183, 15s.

133. 2|540
At £$\frac{1}{2}$=270
" £$\frac{1}{4}$=135
" £$\frac{1}{8}$= 67.5
£472.5=£472, 10s.

Or, $540 \times £\frac{7}{8}$
7
8)3780
Ans. £472.5=£472, 10s.

134. 3)33750
£11250. *Ans.*

ART. **303.** (p. 283.)

136 2s. 8d., N. Y. c.$=\frac{1}{3}$ doll.
3)1360
$$453\frac{1}{3}$. *Ans.*

137. 1 shill.$=\frac{1}{8}$ doll.
8)1760
$220. *Ans.*

138. 2 shill.$=\frac{1}{4}$ doll.
4)963
$240.75. *Ans.*

139. 3 shill.$=\frac{3}{8}$ doll.
8)848
106
3
$318. *Ans.*

140. 5s. 4d.$=\frac{2}{3}$ doll.
3)1875
625
2
$1250. *Ans.*

Or, 2)1875
At $$\frac{1}{2}$= 937.5
" $$\frac{1}{6}$= 312.5
$1250.0. *Ans.*

141. 6 shill.$=\frac{3}{4}$ doll.
4)2163
540.75
3
$1622.25. *Ans.*

Or, 2)2163
2)1081.5, at $\frac{1}{2}$ doll.
540.75, at $\frac{1}{4}$ doll.
$1622.25. *Ans.*

142. 4s. 6d.$=\frac{1}{2}+\frac{1}{16}$ doll.
2)1942
At $$\frac{1}{2}$ =971
" $$\frac{1}{16}$=121.375
$1092.375. *Ans.*

143. 1s. 4d.$=\frac{1}{6}$ doll.
6)1673
$$278\frac{5}{6}$. *Ans.*

144. 2)1386
At $½=693
" $⅛=173.25
¼ of ⅛= 43.31¼
$909.56¼ *Ans.*

145. 2)1068
At $½ =534
" $¼ =267
" $1/16= 66.75
$867.75. *Ans.*

146. 2s. 8d.=⅓ doll.
3)2960
$986⅔. *Ans.*

147. Given.

148. 3 shill. N. E. c.=½ doll.
2)840
$420. *Ans.*

149. 1s. 6d.=¼ doll.
4)1360
$340. *Ans.*

150. 4 shill.=⅔ doll.
3)1124
374⅔
2
$749⅓. *Ans.*

151. 4s. 6d.=¾ doll.
2)972
At $½=486
" $¼=243
$729. *Ans.*

152 2)1372
At $½ =686
" $⅓ =457⅓
" $1/24= 57⅙
$1200.50. *Ans.*

Or, 5s. 6d.=⅞ doll.
8)1372
171.50
7
$1200.50. *Ans.*

ART. 304. (p. 284.)

153. Given.

154. 2 qrs.	½	$12.40
		3
		37.20
12½ lbs.	¼	6.20
		1.55
Ans.		$44.95

155. 1 qr.	¼	$10.60
		9
		95.40
10 lbs.	⅖	2.65
		1.06
Ans.		$99.11

156. 2 qrs.	½	$9.356
		12
		112.272
1 qr.	½	4.678
5 lbs.	⅕	2.339
		.4678
Ans.		$119.7568

157. 1 qr.	¼	$17.20
		21
		17.20
		344.0
10 lbs.	⅖	4 30
		1.72
Ans.		$367.22

158.	2 qrs.	$\frac{1}{2}$	$21.84
			35
			109.20
			655.2
	20 lbs.	$\frac{2}{5}$	10.92
			4.36$\frac{4}{5}$
	Ans.		$779.688

159.	4 cwt.	$\frac{1}{5}$	$6.25
			43
			18.75
			250.0
	1 qr.	$\frac{1}{16}$	1.25
			.078125
	Ans.		$270.078125

160.	5 cwt.	$\frac{1}{4}$	$17.30
			52
			34.60
			86.50
	2 qrs.	$\frac{1}{10}$	4.325
			.4325
	Ans.		$904.3575

161.	2 cwt.	$\frac{1}{10}$	$45.60
			260
			2736.00
			9120
	1 qr.	$\frac{1}{8}$	4.560
			.570
	Ans.		$11861.13

162.	2 qrs.	$\frac{1}{2}$	$1.34
			45
			6.70
			53.6
	1 na.	$\frac{1}{8}$	.67
			.08375
	Ans.		$61.05375

163.	1 qr.	$\frac{1}{4}$	$7.90
			84
			31.60
			632.0
	2 na.	$\frac{1}{2}$	1.975
			.9875
	Ans.		$666.5625

164.	2 R.	$\frac{1}{2}$	$24.20
			45
			121.00
			968.0
	20 r.	$\frac{1}{4}$	12.10
			3.025
	Ans.		$1104.125

165.	1 R.	$\frac{1}{4}$	$43.64
			63
			130.92
			2618.4
	10 r.	$\frac{1}{4}$	10.91
			2.7275
	Ans.		$2762.9575

166.	6 m.	$\frac{1}{2}$	$384
			5
			1920
			192
	10 d.	$\frac{1}{3}$ m.	10$\frac{2}{3}$
	Ans.		2122\frac{2}{3}$

167.	4 m.	$\frac{1}{3}$	$1872
			16
			11232
			1872
			624
	15 d.	$\frac{1}{2}$ m.	78
	Ans.		$306[illegible]4

168. 3 m.	$\frac{1}{4}$	$864		
		6		
		5184		
		216		
5 d.	$\frac{1}{6}$ m.	12		

Ans. $5412

169. 1 qr.	$\frac{1}{4}$	£2,	6s.	4d.
				64
		148	5	4
10 lbs.	$\frac{2}{5}$	0	11	7
			4	$7\frac{3}{5}$

Ans. £149, 1s. $6\frac{3}{5}$d.

170. 2 qrs.	$\frac{1}{2}$	£3,	17s.	3d.
				94
		363	1	6
5 lbs.	$\frac{1}{16}$	1	18	$7\frac{1}{2}$
		0	3	$10\frac{7}{20}$

Ans. £365, 4s. $11\frac{17}{20}$d

171.

5 cwt.	$\frac{1}{4}$	£6,	15s.	7d.
				17
		115	4	11
		1	13	$10\frac{3}{4}$
2 qrs.	$\frac{1}{2}$		3	$4\frac{2}{4}\frac{7}{6}$

Ans. £117, 2s. $2\frac{1}{4}\frac{7}{6}$.

172.

9 gals.	$\frac{1}{7}$	£16,	8s.	3d.
				35
		574	8	9
		2	6	$10\frac{4}{7}$
2 qts.	$\frac{1}{2}$		2	$7\frac{1}{4}\frac{1}{2}$

Ans. £576, 18s. $2\frac{4}{4}\frac{1}{2}$d.

173.

7 gals.	$\frac{1}{8}$	£17,	9s.	7d.
				87
		1520	13	9
		1	18	$10\frac{1}{8}$
1 qt.	$\frac{1}{28}$		1	$4\frac{1}{2}\frac{6}{5}\frac{3}{2}$

Ans. £1522, 13s. $11\frac{1}{2}\frac{2}{5}\frac{1}{2}$d

174.

2 qrs.	$\frac{1}{2}$		19s.	$5\frac{1}{2}$d.
				139
		135	4	$8\frac{1}{2}$
			9	$8\frac{3}{4}$
1 na.	$\frac{1}{4}$ qr.		1	$2\frac{1}{3}\frac{9}{2}$

Ans. £135, 15s. $7\frac{2}{3}\frac{7}{2}$d.

175. 295 bu. 2 pks. 4 qts.= 295.625 bu.

295.625 b

At $1 = $295.625

At .12$\frac{1}{2}$ (\$$\frac{1}{8}$) = 36.9531

At .06$\frac{1}{4}$ ($\frac{1}{2}$ of $\frac{1}{8}$) = 18.4765

Ans. $351.0546

176. $12644.8359375. *Ans*

177. 12)5268 quills.

.06$\frac{1}{4}$ ($\frac{1}{16}$)439 doz.

Ans. $27.4375.

178. At $1 = $152.63

3

At $3 = 457.89

At \$$\frac{3}{4}$ = 114.4725

Ans. $572.3625

179. $319.625. *Ans.*

SIMPLE PROPORTION.

ART. 327. (p. 292.)

1—4. Given.

5. 8 bbls : 15 bbls :: \$40 : \$75. *Ans.*

6. 16 lbs : 41 lbs :: \$12 : \$30.75. *Ans.*

7. 12 A : 57 A :: 240 bu : 1140 bu. *Ans.*

8. 15 d : 9 d :: 400 m : 240 m. *Ans.*

ART. 328. (p. 294.)

9, 10. Given.

11. 18 m : 6 m :: 36 d : Ans.*

$$\begin{array}{r|l} \cancel{18} & 6 \\ & \cancel{36},\ 2 \\ \hline \textit{Ans.} & 6\times 2=12\text{ d.} \end{array}$$

Or, $\cancel{18}$ m : 6 m :: $\cancel{36}$, 2 d : 12 d. *Ans.*

12. 10 q : 17 q :: \$35 : Ans.

$$\frac{17\times\cancel{35},\ 7}{\cancel{10},\ \ 2}=\frac{119}{2}=\$59\tfrac{1}{2}.\ \textit{Ans.}$$

13. 15 m : 25 m :: 8 mo : A.

$$\frac{5,\ \cancel{25}\times 8}{3,\ \cancel{15}}=\frac{40}{3}=13\tfrac{1}{3}\text{ mo. } \textit{Ans.}$$

14. 12 lbs : 84 lbs : \$1 : Ans.

$$\frac{7,\ \cancel{84}\times 1}{\cancel{12}}=\frac{7}{1}=\$7.\ \textit{Ans.}$$

15. 15 l : 80 l :: \$1.15 : Ans.

$$\frac{16,\ \cancel{80}\times 1.15}{3,\ \cancel{15}}=\frac{18.40}{3}=$$

\$6.13⅓. *Ans.*

16. Given.

17. $\frac{4}{7}$ h : 16 h :: \$28 : Ans.

$$\frac{7}{\cancel{4}}\times\frac{4,\ \cancel{16}}{1}\times\frac{28}{1}=\$784.\ \textit{Ans.}$$

18. 2¼ y : 27 y :: \$18 : Ans.

$$\frac{4}{\cancel{9}}:\frac{3,\ \cancel{27}}{1}::\frac{18}{1}\cdot\$216.\ \textit{Ans.}$$

19. 1000 r : 4120 r :: \$125 :

$$\begin{array}{r|l} \cancel{1000} & \cancel{4120}\ \ 515 \\ \cancel{8} & \cancel{125} \\ \hline \textit{Ans.} & \$515 \end{array}$$

20. 15 y : 75 y :: 90s : Ans.

$$\frac{5,\ \cancel{75}\times 90}{\cancel{15}}=450\text{s.}$$

450s = £22, 10s *Ans.*

21. 1 h 45 m : 3 d :: 35 m : A.

$$\frac{4320\times\cancel{35}}{3,\ \cancel{105}}=1440\text{ m } \textit{Ans.}$$

22. 4½ l . 22½ l :: 9s : Ans.

$$\frac{\cancel{2}}{\cancel{9}}\times\frac{45}{\cancel{2}}\times\frac{\cancel{9}}{1}=45\text{s}=\pounds 2,\ 5\text{s } \textit{Ans.}$$

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* It is advisable, at first, for the learner to state the question according to the rule; (Art. 327;) then arrange the terms for Cancellation.

23. $\frac{107}{3}\text{ l} : \frac{91}{6}\text{ l} :: \$4 : \text{Ans.}$

$$\frac{\cancel{3}}{107}\times\frac{91}{\cancel{6},\ \cancel{2}}\times\frac{\cancel{4},\ 2}{1}=\frac{182}{107}=$$

\$1.70+. *Ans.*

24. $84\text{ l} : 60\text{ l} :: \$\frac{42}{8} : \text{Ans.}$

$$\begin{array}{r|l} \cancel{2},\ \cancel{84} & \cancel{60},\ 30 \\ 8 & ::\ \cancel{42} \\ \hline 8 & 30=\$3.75.\ \textit{Ans.} \end{array}$$

25. $\frac{3}{8}\text{ S} : \frac{5}{16}\text{ S} :: \$6000 : \text{A.}$

$$\begin{array}{r|l} \cancel{3} & \cancel{8} \\ 2,\ \cancel{16} & 5 \\ & \cancel{6000},\ 2000 \\ \hline 2 & 10000=\$5000. \end{array}$$

Ans.

26. $4\frac{1}{2}$ bu : 84 bu :: 1 bbl : $18\frac{2}{3}$ bbls. *Ans.*

27. 12 mo : 8 mo :: \$90 : \$60. *Ans.*

28. 20 ft : 50 ft :: 30 ft : 75 ft. *Ans.*

29. 3000 m : 25000 m :: 12 d : 100d . *Ans.*

30. \$56 : \$840 :: 7 A : 105 A. *Ans.*

31. 13 c : 85 c :: \$91 : Ans.

$$\frac{85\times\cancel{91},\ 7}{\cancel{13}}=\$595.\ \textit{Ans.}$$

32 \$45 : \$980 :: 6 cwt : $130\frac{2}{3}$ cwt. *Ans.*

33. 9 oz : 300 oz :: 4 S : $133\frac{1}{3}$ S. *Ans.*

34. 300 cwt : 5 cwt :: \$90000 : \$1500. *Ans*

35. $5\frac{1}{2}\text{ y} : 50\frac{1}{4}\text{ y} :: \$27\frac{1}{2} : \text{Ans.}$

$$\begin{array}{r|l} \cancel{11} & \cancel{2} \\ 4 & 201 \\ \cancel{2} & \cancel{55},\ 5 \\ \hline 4 & 1005=\$251\frac{1}{4}.\ \textit{Ans.} \end{array}$$

36. $15\text{ m} : 60\text{ m} :: 90\frac{1}{2}\text{ d} : \text{A.}$

$$\frac{4,\ \cancel{60}\times 91\frac{1}{2}}{\cancel{15}}=362\text{ d.}$$

Ans.

37. \$25000 : \$1 :: \$20000 : \$.80. *Ans.*

38. 7s 6d : £24, 10s :: 1 w : $65\frac{1}{3}$ w. *Ans.*

39. 141 T : 94 T :: £85 : £56, 13s 4d. *Ans.*

40. 13 yds . 291 yds :: £8, 6s $3\frac{1}{2}$d : £186, 2s $4\frac{1}{2}$d. *Ans.*

41. 100 lbs : 3 lbs :: £6, 7s 6d : 3s $9\frac{9}{10}$d. *Ans.*

42. 20 S : 311 S :: £37, 12s 6d : £585, 1s $4\frac{1}{2}$d. *Ans.*

43. 1 oz : 9 oz 13 pwts 8 grs :: 7s 6d : £3, 12s 6d. *Ans.*

44. 405 yds : 243 yds :: £69, 7s 6d : £41, 12s 6d. *Ans.*

45. Since A can saw 1 cord in 6 hrs., in 1 hr. he can saw $\frac{1}{6}$ of a cord. And since B can saw 1 cord in 9 hrs., in 1 hr. he can saw $\frac{1}{9}$ of a cord. Then both together can saw $\frac{1}{6}+\frac{1}{9}=\frac{5}{18}$ of a cord in 1 hr. Hence,

$\overset{\text{cord.}}{\frac{5}{18}} : \overset{\text{cord.}}{\frac{18}{18}} :: \overset{\text{h.}}{1}$: Ans.

$$\begin{array}{r|l} 5 & 18 \\ \cancel{18} & \cancel{18} \\ & 1 \\ \hline \textit{Ans.}\ 5 & 18 = 3\frac{3}{5} \text{ hrs.} \end{array}$$

In 1 min all running together will empty $\frac{1}{10}+\frac{1}{15}+\frac{1}{30}=\frac{6}{30}$ of the cistern.

Then $\overset{\text{cistern.}}{\frac{6}{30}} : \overset{\text{cistern.}}{\frac{30}{30}} :: \overset{\text{min.}}{1}$: Ans.

$$\begin{array}{r|l} \cancel{6} & \cancel{30}\ 5 \\ \cancel{30} & \cancel{30} \\ & 1 \\ \hline \textit{Ans.} & 5 \text{ min.} \end{array}$$

47. Both together can mow $\frac{1}{4}$ of an acre in 1 hour. The man can mow $\frac{1}{6}$ of an acre in 1 hr. Hence, the boy can mow $\frac{1}{4}-\frac{1}{6}=\frac{1}{12}$ of an acre in 1 hr.

Then $\overset{\text{acre.}}{\frac{1}{12}} : \overset{\text{acre.}}{\frac{12}{12}} :: \overset{\text{hr.}}{1}$: Ans.

$$\begin{array}{r|l} 1 & 12 \\ \cancel{12} & \cancel{12} \\ & 1 \\ \hline \textit{Ans.} & 12 \text{ hours.} \end{array}$$

48 £673, 15s $6\frac{1}{2}$d = 646826 far.

265.6 yds : 123 4 yds :: 646826 f : Ans.

$$\begin{array}{r} 123.4 \\ \hline 265.6\overline{)79818328.4} \\ \hline \text{far } 300520.8 \end{array}$$

Ans. £313, 10.2d.

49. 12s 8d = 152d.

1 oz : $6\frac{6}{8}$ oz :: 152d : A.

$$\begin{array}{r} 6\frac{6}{8} \\ \hline 1026\text{d.} \end{array}$$

Ans. £4, 5s. 6d.

50. $\frac{3}{16}$ S : $\frac{5}{32}$ S :: £$273\frac{1}{8}$: A.

$$\frac{\cancel{16}}{3}\times\frac{5}{\cancel{32},\,2}\times\frac{2185}{8}=$$

£$\frac{10925}{48}$.

Ans. £227, 12s. 1d

51. $7\frac{5}{8}$ yds : $49\frac{3}{11}$ yds :: £7, 18s 4d : Ans.

1900d × $49\frac{3}{11}$ = $93618\frac{2}{11}$d

$93618\frac{2}{11} \div 7\frac{5}{8}$ =

12277d. $3\frac{119}{671}$ far.

Ans. £51, 3s. 1d. $3\frac{119}{671}$ far

52. £100 : £362, 8s $7\frac{1}{2}$d :: £$98\frac{7}{8}$: Ans.

Or, 96000 f : 347934 f :: £$98\frac{7}{8}$: *Ans.*

$$\begin{array}{r} 347934 \\ 98\frac{7}{8} \\ \hline 96000\overline{)34401974.25} \\ \hline £358.35389 \end{array}$$

Ans. £358, 7s. 0d. 3 far.

53. £37, 10s = 750s.

15 T : 1 T :: 750s : gain pr. T

$$\begin{array}{l} 15\overline{)750} \\ \hline \quad 50\text{s gain pr. ton,} \\ \quad 750\text{s cost " "} \\ \hline 10\overline{)800\text{s}} \text{ selling p.} \\ \hline \quad £40.\ \textit{Ans.} \end{array}$$

54. 35 A 2 R 10 r=5690 r.
46 A 3 R 14 r=7494 r.
7494 r : 5690 r :: £50 : A.
50
7494)284500
Ans. £37, 19s. 3d. $1\frac{195}{1249}$ f.

55. £76, 3s $4\frac{1}{3}$d=$18280\frac{1}{3}$d.
12d : $18280\frac{1}{3}$d :: 8d : A.
8
12)$146242\frac{2}{3}$
$12186\frac{8}{9}$d.
Ans. £50, 15s. $6\frac{8}{9}$d.

56. $\frac{1}{3}+\frac{1}{10}=\frac{13}{30}$ pasture.
£4, 10s=90s.
$\frac{13}{30}$ p : 1 p :: 90s : Ans.
30
13)2700
$207\frac{9}{13}$s.
Ans. £10, 7s. $8\frac{4}{13}$d.

57. 10 A : 840 A :: 1d : 84d
8 A : 240 A :: 1d : 30d
Hence, 1080 A cost 114d
$9,\cancel{36}$ A : 1080 A :: $\cancel{4}$d :
120d. sum rec'd.
120d.—114d.=6d. gain.
Ans.

58. 27 T 3 qrs 15 lbs=
54090 lbs.
119 T 1 qr 10 lbs=
238035 lbs.
54090 lbs : 238035 lbs ::
$217.83 : Ans.
238035
217.83
54090)51851164.05
Ans. $958.609

59. 18 m 3 fur 25 r=:5905 r.
$3\frac{2}{3}$ hr : $48\frac{1}{2}$ hr :: 5905 :
Ans
5905
$48\frac{1}{2}$
$3\frac{2}{3}$)$286392\frac{1}{2}$
$78107\frac{1}{22}$ r.
Ans. 244 m. 0 fur. $27\frac{1}{22}$ r.

60. $\frac{11}{15}\text{ m} : \frac{11}{20}\text{ m} :: \$\frac{8}{15}$: Ans.

$$\frac{\cancel{15}}{\cancel{11}}\times\frac{\overset{2}{\cancel{8}}}{\cancel{15}}\times\frac{\cancel{11}}{\underset{5}{\cancel{20}}}=\$\frac{2}{5}.$$
Ans.

61. $\frac{19}{20}\text{ C} : \frac{29}{35}\text{ C} :: £\frac{13}{20}$: Ans.

$$\frac{\cancel{20}}{19}\times\frac{29}{35}\times\frac{13}{\cancel{20}}=£\frac{377}{665}.$$
Ans.

62. $162.50—$125=$37.50.
$125 : $1 :: $37.50 : Ans.
125)37.50
Ans. 30 per ct.

63. $1 : $7265 ::
$15\frac{5}{8}$ per ct : Gain.
$7265
$.15\frac{5}{8}$
$\$1135.15\frac{5}{8}$ gain,
7265.
$\$8400.15\frac{5}{8}$. *Ans.*

64. $9.625×175=$1684.375
$1 : $1684.375 ::
$7\frac{1}{2}$ per ct : Loss.
$1684.375
.075
$126.328125. *Ans*

65. \$675.25 : \$2368.85 : \$55.625 : Ans.

$$\begin{array}{r} \$2368.85 \\ 55.625 \\ \hline 675.25)131767.28125 \\ \hline \textit{Ans.}\ \$195.1385 \end{array}$$

66. \$.07 : \$1565.50 :: \$1 : Ans.

$$\begin{array}{r} .07)1565.5000 \\ \hline \$22364.2857.\ \textit{Ans.} \end{array}$$

67. $\$.23\frac{1}{2}$: \$45265 :: \$1 : Ans.

$$\begin{array}{r} .235)45265.000 \\ \hline \$192617.0212.\ \textit{Ans.} \end{array}$$

68. \$.15 : \$500 :: \$1 : Ans.

$$\begin{array}{r} .15)500.00 \\ \hline \$3333\frac{1}{3}\ \text{cost.} \\ 500 \\ \hline \textit{Ans.}\ \$3833\frac{1}{3}\ \text{fut. val.} \end{array}$$

69. $9\frac{3}{4}$ in : 12 in :: 12 in : A.

$$\begin{array}{r} 12 \\ \hline 9\frac{3}{4})144 \\ \hline \textit{Ans.}\ 14\frac{10}{13}\ \text{in. long.} \end{array}$$

70. $\frac{3}{4}$ yd : $1\frac{1}{4}$ yd :: $81\frac{1}{2}$ yd : A.

$$\begin{array}{r} 1\frac{1}{4} \\ \hline 109\frac{3}{8} \\ 4 \\ \hline 3)437\frac{1}{2} \\ \hline \textit{Ans.}\ 145\frac{5}{6}\ \text{yds.} \end{array}$$

COMPOUND PROPORTION.

ART. **330.** (p. 299.)

1. Given.

2. $\left.\begin{array}{l} 9\ \text{r} : 18\ \text{r} \\ 4\ \text{d} : \ 6\ \text{d} \end{array}\right\}$ :: 12 m : Ans.

$$\begin{array}{rr} 36 & 108 \\ & 12 \\ \hline & 36)1296 \\ \hline & 36\ \text{men.}\ \textit{Ans.} \end{array}$$

Or,

$$\begin{array}{r|l} \cancel{9}\ \text{r} & \cancel{18}\ \text{r} \\ \cancel{2}, \cancel{4}\ \text{d} & \cancel{6}\ \text{d}, 3 \\ & ::\ 12\ \text{m} \\ \hline \textit{Ans.} & 3\times 12=36\ \text{men.} \end{array}$$

ART. **331.** (p. 300.)

3, 4. Given.

5. $\left.\begin{array}{l} 9\ \text{r} : 36\ \text{r} \\ 4\ \text{d} : 12\ \text{d} \end{array}\right\}$ :: 8 m : Ans.

$$\begin{array}{r|l} \cancel{9} & \cancel{36} \\ \cancel{4} & 12 \\ & ::\ 8 \\ \hline \textit{Ans.} & 96\ \text{men.} \end{array}$$

Note.—Since the factors 4 into 9=36, both may be canceled at once. Hence, when the product of any two or more factors on one side of the line is equal to the product of two or more factors on the other side, all may be canceled at once.

6. $\left.\begin{array}{l} 240\ \text{p} : 300\ \text{p} \\ 15\ \text{d} : 24\ \text{d} \end{array}\right\}$ :: 5 m : A.

$$\begin{array}{r|l} 10, \cancel{240} & \cancel{300}, 20 \\ \cancel{15} & \cancel{24} \\ & ::\ 5 \\ \hline 10 & 100=10\ \text{m.}\ \textit{Ans.} \end{array}$$

7. $$\left.\begin{array}{l}60\text{ lbs} : 72\text{ lbs}\\ 24\text{ m} : 8\text{ m}\end{array}\right\} :: 15\text{ d} : \text{A.}$$

$$\begin{array}{r|l} 4, \cancel{60} & \cancel{72}, 3 \\ \cancel{24} & \cancel{8}, 2 \\ & :: \cancel{15} \\ \hline \textit{Ans.} & 3\times 2=6\text{ d.} \end{array}$$

8 $$\left.\begin{array}{l}25\text{ m} : 12\text{ m}\\ 80\text{ A} : 200\text{ A}\end{array}\right\} :: 6\text{ d} : \text{A.}$$

$$\begin{array}{r|l} 25 & \cancel{12}, 3 \\ \cancel{4}, \cancel{80} & \cancel{200}, 10 \\ & :: 6 \\ \hline 25 & 180=7\tfrac{1}{5}\text{ d. } \textit{Ans.} \end{array}$$

9. $$\left.\begin{array}{l}18\text{ h} : 12\text{ h}\\ 32\text{ d} : 64\text{ d}\end{array}\right\} :: 128\text{ b} : \text{A.}$$

$$\begin{array}{r|l} 3, \cancel{18} & \cancel{12}, 2 \\ \cancel{32} & \cancel{64}, 2 \\ & :: 128 \\ \hline 3 & 512=170\tfrac{2}{3}\text{ bu. } \textit{Ans.} \end{array}$$

10. $$\begin{array}{r|l} \cancel{24} & 8 \\ \cancel{20} & \cancel{200}, 10 \\ \cancel{6} & \cancel{8} \\ \cancel{4} & \cancel{6} \\ & :: \cancel{12}, \cancel{3} \\ \hline \textit{Ans.} & 8\times 10=80\text{ days.} \end{array}$$

Obs.—Should the learner find any difficulty in arranging the terms in pairs, it will be advisable for him to find the solid contents of each wall, before stating the question. (Art. 154. Obs. 3.) Thus, the solidity of the first wall is 20×6×4=480 cu. ft. That of the second is 200×8×6=9600 cubic feet. Then,

$$\left.\begin{array}{r}24 : 8\\ 480 : 9600\end{array}\right\} :: 12 : \text{Ans.}$$

11. $$\begin{array}{r|l} \cancel{36} & \cancel{48}, \cancel{4} \\ \cancel{12} & \cancel{9} \\ 12 & 9 \\ & :: 8 \\ \hline 12 & 72=6\text{ men. } \textit{Ans} \end{array}$$

12. $$\begin{array}{r|l} 4, \$\cancel{400} & \$\cancel{100} \\ \$\cancel{6} & \$\cancel{18}, 3 \\ & :: 12\text{ m.} \\ \hline 4 & 36=9\text{ m. } \textit{Ans.} \end{array}$$

13. $$\begin{array}{r|l} \$\cancel{200} & \$\cancel{400}, 2 \\ \cancel{12}\text{ m} & 9\text{ m} \\ & :: \$\cancel{12} \\ \hline \textit{Ans.} & \$18. \end{array}$$

14. $$\begin{array}{r|l} \cancel{8}\text{ m} & \cancel{24}\text{ m}, 3 \\ \cancel{13}\text{ w} & \cancel{52}\text{ w}, 4 \\ & :: £32 \\ \hline \textit{Ans.} & £384. \end{array}$$

15. $$\begin{array}{r|l} \cancel{4}, \cancel{24}\text{ m} & \cancel{6}\text{ m} \\ \cancel{20} & \cancel{200}, 10 \\ \cancel{6} & \cancel{8} \\ \cancel{4} & \cancel{6} \\ \cancel{8}\text{ h} & 9\text{ h} \\ & :: \cancel{16}\text{ d} \\ \hline \textit{Ans.} & 90\text{ days.} \end{array}$$

16. $$\left.\begin{array}{l}10\text{ yds} : 100\text{ y}\\ 1\tfrac{1}{2}\text{ yd} : \ 1\tfrac{1}{4}\text{ y}\end{array}\right\} :: 3\text{ l} \quad \text{A}$$

$$\begin{array}{l} \hline 15 \quad : 125 \qquad :: 3 : \text{A} \end{array}$$

$$\frac{125\times\cancel{3}}{\cancel{15}, 5}=25\text{ lbs. } \textit{Ans.}$$

Or, $$\begin{array}{r|l} \cancel{10} & \cancel{100}, 25 \\ \cancel{3} & \cancel{2} \\ \cancel{4} & 5 \\ & :: \cancel{3} \\ \hline \textit{Ans.} & 25\text{ lbs.} \end{array}$$

17. 15 tons=30000 lbs.

80000−30000=50000.

$$\left.\begin{array}{r}30000 : 50000\\ 3\text{ d} : \quad 6\text{ d}\end{array}\right\} :: 18\text{ h} : \text{A.}$$

$$\frac{5\cancel{0000}\times 6\times\cancel{18}, 2}{\cancel{30000}\times\cancel{3}}=60\text{ h.}$$

Ans. 60 horses.

18. $\left.\begin{array}{r}130\text{ n.} : 390\text{ m}\\ 7\text{ hrs} : 14\text{ hrs}\end{array}\right\} :: 3\text{ ds} :$ Ans.

$$\frac{3,\ \cancel{3}\cancel{9}\cancel{0}\times 3\times \cancel{1}\cancel{4},\ 2}{\cancel{1}\cancel{3}\cancel{0}\times\cancel{7}}=18\text{ d. } \textit{Ans.}$$

19. 3 lbs 10 oz = 58 oz.
4s 2d = 50d, 5s 5d = 65d.

$$\begin{array}{r|l}\cancel{5},\ \cancel{1}\cancel{0}\text{ oz} & \cancel{5}\cancel{8}\text{ oz, }29\\ 10,\ \cancel{5}\cancel{0}\text{d} & \cancel{6}\cancel{5}\text{d, }13\\ & ::\ \cancel{5}\text{d}\\ \hline 10 & 377=37\tfrac{7}{10}\text{d. } \textit{Ans.}\end{array}$$

20.

$$\begin{array}{r|l}\cancel{6}\text{ m} & \cancel{1}\cancel{8}\text{ m, }\cancel{3}\\ \cancel{4}\frac{\cancel{1}}{\cancel{2}}\text{ w} & \cancel{1}\cancel{3}\frac{\cancel{1}}{\cancel{2}}\text{ w, }3\\ \cancel{5}\frac{\cancel{1}}{\cancel{2}}\text{ d} & \cancel{4}\frac{\cancel{1}}{\cancel{4}}\text{ d}\\ \cancel{3},\ \cancel{1}\cancel{2}\frac{\cancel{3}}{\cancel{4}}\text{ hr} & \cancel{1}\cancel{1}\text{ hr, }2\\ & ::\ 132\text{ pr}\\ \hline \textit{Ans.} & 132\times3\times2=792\text{ pair.}\end{array}$$

DUODECIMALS.—(p. 302.)

Art. 333.

1. Given.
2. 78 feet 5 inches.
3. 193 ft. 1 in. 2″.
4. 247 ft. 7 in. 2″.
5. 252 ft. 8 in. 7″.
6. 892 ft. 1 in.
7. Given.
8. 41 ft. 9 in. 9″.
9. 11 ft. 5 in. 6″.
10. 71 ft. 5 in., sum.
    14 ft. 7 in., dif.
11. 119 ft. 4 in. 6″.
    17 ft. 4 in. 6″.
12. 229 ft. 5 in. 9″.
    21 ft. 11 in. 1″.

MULTIPLICATION OF DUODECIMALS.

Art. 336. (p. 305.)

1. Given.

2.
$$\begin{array}{rrr}18\text{ ft.} & 9' & \\ 2\text{ ft.} & 6' & \\ \hline 37\text{ ft.} & 6' & \\ 9\text{ ft.} & 4' & 6''\\ \hline 46\text{ ft.} & 10' & 6''.\ \textit{Ans.}\end{array}$$

3.
$$\begin{array}{rrr}14\text{ ft.} & 10' & \\ & 11' & \\ \hline 13\text{ ft.} & 7' & 2''.\ \textit{Ans.}\end{array}$$

4.
$$\begin{array}{rrr}12\text{ ft.} & 5' & \\ 6\text{ ft.} & 8' & \\ \hline 74\text{ ft.} & 6' & \\ 8\text{ ft.} & 3' & 4''\\ \hline 82\text{ ft.} & 9' & 4''.\ \textit{Ans.}\end{array}$$

5.
$$\begin{array}{rrr}16\text{ ft.} & 6' & \\ 12\text{ ft.} & 9' & \\ \hline 198\text{ ft.} & 0' & \\ 12\text{ ft.} & 4' & 6''\\ \hline 210\text{ ft.} & 4' & 6''.\ \textit{Ans.}\end{array}$$

6. 53 ft. 6′
25 ft. 6′
1337 ft. 6′
26 ft. 9′
1364 ft. 3′. *Ans.*

7. 17 ft. 7′
1 ft. 5′
17 ft. 7′
7 ft. 3′ 11″
24 ft. 10′ 11″
6
149 ft. 5′ 6″. *Ans.*

8. 12 ft. 8′
1 ft. 1′
12 ft. 8′
1 ft. 0′ 8″
13 ft. 8′ 8″
10
137 ft. 2′ 8″. *Ans.*

9. 12 ft. 10′
1 ft. 7′
12 ft. 10′
7 ft. 5′ 10″
20 ft. 3′ 10″
1 ft. 9′
20 ft. 3′ 10″
15 ft. 2′ 10″ 6‴
35 ft. 6′ 8″ 6‴. *Ans.*

10. 8 ft. 4′
2 ft. 6′
16 ft. 8′
4 ft. 2′
20 ft. 10′
1 ft. 10′
20 ft. 10′ (car. for'd.)

(Brought for'd.)
20 ft. 10′
17 ft. 4′ 4″
38 ft. 2′ 4″. *Ans.*

11. 6 ft. 7′
3 ft. 5′
19 ft. 9′
2 ft. 8′ 11″
22 ft. 5′ 11″
3 ft. 8′
67 ft. 5′ 9″
14 ft. 11′ 11″ 4‴
82 ft. 5′ 8″ 4‴. *Ans*

12. 7 ft. 2′
4 ft.
28 ft. 8′
3 ft.
86 ft. 0′. *Ans.*

13. 4 ft. 3′
9 ft.
38 ft. 3′
5 ft. 6′
191 ft. 3′
19 ft. 1′ 6″
210 ft. 4′ 6″. *Ans.*

14. 2)100 ft.
5½ ft.
500 ft.
50
550 ft.
4 ft.
2200 ft. *Ans.*

15.

$$\begin{array}{r} 150 \text{ ft.} \\ 8\frac{1}{2} \text{ ft.} \\ \hline 1200 \text{ ft.} \\ 75 \\ \hline 1275 \text{ ft.} \\ 5 \text{ ft.} \\ \hline 6375 \text{ ft. } \textit{Ans.} \end{array}$$

16.

$$\begin{array}{r} 40 \text{ ft. } 6' \\ 5 \text{ ft. } 10' \\ \hline 202 \text{ ft. } 6' \\ 33 \text{ ft. } 9' \\ \hline 236 \text{ ft. } 3' \\ 2 \text{ ft.} \\ \hline 472 \text{ ft. } 6'. \ \textit{Ans.} \end{array}$$

17.

$$\begin{array}{r} 10 \text{ ft. } 8' \\ 7 \text{ ft. } 2' \\ \hline 74 \text{ ft. } 8' \\ 1 \text{ ft. } 9'\ 4'' \\ \hline 76 \text{ ft. } 5'\ 4'' \\ 6 \text{ ft. } 4' \\ \hline 458 \text{ ft. } 8'\ 0'' \\ 25 \text{ ft. } 5'\ 9''\ 4''' \\ \hline 484 \text{ ft. } 1'\ 9''\ 4'''. \ \textit{Ans.} \end{array}$$

18. $20 \times 10 \times 1\frac{1}{2} = 300$ cu. ft., and $300 \times 1728 = 518400$ cu. in. $8 \times 4 \times 2 = 64$ cu. in. Then, $518400 \div 64 = 8100$.
Ans. 8100 bricks.

19.

$$\begin{array}{r} 18 \text{ ft.} \\ 20 \text{ ft.} \\ \hline 4)360 \text{ ft.} \\ 6\frac{1}{4} \text{ cts.} \\ \hline 2160 \\ 90 \\ \hline \$22.50. \ \textit{Ans.} \end{array}$$

20.

$$\begin{array}{r} 16 \text{ ft.} \\ 16 \text{ ft.} \\ \hline 9)256 \text{ ft.} \\ \hline 28\frac{4}{9} \text{ sq. yds.} \\ .125 \\ \hline 140 \\ 56 \\ 28 \\ 55\frac{5}{9} \\ \hline \$3.555\frac{5}{9}. \ \textit{Ans.} \end{array}$$

INVOLUTION.

Art. 342. (p. 308.)

1—11. Given.

12. $(45)^2 = 2025$. $(50)^2 = 2500$. $(75)^2 = 5625$. $(100)^2 = 10000$. $(540)^2 = 291600$.

13. $(5)^3 = 125$. $(8)^3 = 512$. $(10)^3 = 1000$. $(12)^3 = 1728$ $(60)^3 = 216000$.

14. $(3)^4 = 81$. $(4)^4 = 256$. $(16)^4 = 65536$. $(20)^4 = 160000$.

15. $(2)^5 = 32$. $(3)^5 = 243$. $(4)^5 = 1024$. $(5)^5 = 3125$. $(6)^5 = 7776$.

16. $(\frac{1}{2})^2=\frac{1}{4}$. $(\frac{1}{4})^2=\frac{1}{16}$. $(\frac{1}{5})^2=\frac{1}{25}$. $(\frac{2}{3})^2=\frac{4}{9}$. $(\frac{3}{4})^2=\frac{9}{16}$. $(\frac{5}{8})^2=\frac{25}{64}$.

17. $(\frac{2}{3})^3=\frac{8}{27}$. $(\frac{4}{5})^3=\frac{64}{125}$. $(\frac{7}{8})^3=\frac{343}{512}$. $(\frac{10}{20})^3=\frac{1000}{8000}$.

18 $(2\frac{1}{2})^2=6\frac{1}{4}$; or $(2\frac{1}{2})=2.5$; and $2.5\times2.5=6.25$.
$(3\frac{1}{4})=3.25$; and $3.25\times3.25=10.5625$.
$(5\frac{2}{3})=\frac{17}{3}$; and $\frac{17}{3}\times\frac{17}{3}=\frac{289}{9}=32\frac{1}{9}$.
$(10\frac{3}{4})=\frac{43}{4}$; and $\frac{43}{4}\times\frac{43}{4}=\frac{1849}{16}=115\frac{9}{16}$.

19. $(1.5)^2=2.25$. $(3.25)^2=10.5625$. $(10.25)^2=105.0625$.

20. $(.5)^3=.125$. $(.05)^3=.000125$. $(.005)^3=.000000125$. $(.0005)^3=.000000000125$. $(.00005)^3=.000000000000125$.

21. $(2.5)^4=39.0625$. $(5.01)^4=630.01502001$. $(20.02)^4=16064.52864016$. $(45.1)^4=4137196.6801$.

22. $(\frac{9}{10})^3=\frac{729}{1000}$. $(\frac{21}{35})^3=\frac{9261}{42875}$. $(\frac{128}{232})^3=\frac{2097152}{12487168}$. $(\frac{237}{425})^3=\frac{13312053}{76765625}$.

23. $(115\frac{3}{4})=\frac{463}{4}$; $(\frac{463}{4})^3=\frac{99252847}{64}=1550825\frac{47}{64}$.
$(228\frac{11}{12})=\frac{2747}{12}$; $(\frac{2747}{12})^3=\frac{20728886723}{1728}=11995883\frac{899}{1728}$.
$(463\frac{7}{8})=\frac{3711}{8}$; $(\frac{3711}{8})^3=\frac{51106114431}{512}=998166239\frac{63}{512}$.

24. $(.045)^5=.000000184528125$.

25. $.007\times.007\times.007\times.007\times.007\times.007=$ .000000000000117649, 6th power.
$.000000000000117649\times.000000000000117649=$ .00000000000000000000000013841287201, the 12th power. *Ans.*

26. 5×5×5×5×5=3125, 5th power; 3125×3125= 9765625, 10th power; 9765625×9765625= 95367431640625, 20th power. *Ans.*

27. 4×4×4×4×4=1024, 5th power; 1024×1024= 1048576, 10th power; 1048576×1024= 1073741824, 15th p.; 1099511627776, 20th p.; 136339441844224, 25th p.; 139611588448185376, 30th power. *Ans.*

28. $3\times3\times3\times3\times3=243$, 5th p.; $243\times243=59049$, 10th p.; 3486784401, 20th p.; 205891132094649, 30th p.; 12157665459056928801, 40th p. *Ans.*

29. $2\times2\times2\times2\times2=32$, 5th p.; $32\times32=1024$, 10th p.; $1024\times1024=1048576$, 20th p.; 1073741824, 30th p.; 1099511627776, 40th p.; 1125899906842624, 50th; 2251799813685248, 51st p. *Ans.*

SQUARE ROOT.

Art. 351. (p. 314.)

1, 2. Given.

3.
$$\begin{array}{r} \dot{6}2\dot{5}(25.\ \textit{Ans.} \\ 4 \\ 45)\overline{225} \\ \underline{225} \end{array}$$

4. 30.

5.
$$\begin{array}{r} 1\dot{2}2\dot{5}(35.\ \textit{Ans.} \\ 9 \\ 65)\overline{325} \\ \underline{325} \end{array}$$

6. 42.

7.
$$\begin{array}{r} 2916(54.\ \textit{Ans.} \\ 25 \\ 104)\overline{416} \\ \underline{416} \end{array}$$

8.
$$\begin{array}{r} 4\dot{7}61(69.\ \textit{Ans.} \\ 36 \\ 129)\overline{1161} \\ \underline{1161} \end{array}$$

9. 93.

10.
$$\begin{array}{r} \dot{1}2\dot{3}2\dot{1}(111.\textit{Ans.} \\ 1 \\ 21)\overline{23} \\ 21 \\ 221)\overline{221} \\ \underline{221} \end{array}$$

11. 232.

12.
$$\begin{array}{r} 5\dot{3}1\dot{4}4\dot{1}(729.\ \textit{Ans.} \\ 49 \\ 142)\overline{414} \\ 284 \\ 1449)\overline{13041} \\ \underline{13041} \end{array}$$

Art. 352. (p. 315.)

13. Given.

14.
$$\begin{array}{r} \dot{1}.9\dot{6}(1.4.\ \textit{Ans.} \\ 1 \\ 24)\overline{96} \\ \underline{96} \end{array}$$

15. 5.4.

16. $\dot{2}3\dot{4}.0\dot{9}(15.3.$* *Ans.*
1
25)134
125
303)909
909

17. .35.
18. .881.

19. $\dot{2}.0\dot{0}(1.4142+.$ *Ans.*
1
24)100
96
4, &c.

Note.—By adding periods of ciphers, the operation may be continued at pleasure.

20. 4.123+.
21. 13.228+.
22. 342.
23. 3212.
24. The square root of 36 is 6, and the square root of 49 is 7; hence $\sqrt{\frac{36}{49}}$ is $\frac{6}{7}$.
25. $\sqrt{\frac{144}{576}}=\frac{12}{24}$.
26. $\sqrt{\frac{25}{4}}=\frac{5}{2}=2\frac{1}{2}$.
27. $\sqrt{\frac{841}{16}}=\frac{29}{4}=7\frac{1}{4}$.

28 $2\dot{2}4\dot{2}0\dot{2}2\dot{5}(4735.$ *Ans.*
16
87)642
609
943)3302
2829
9465)47325
47325

29. $\dot{5}7\dot{6}4\dot{8}0\dot{1}(2401.$ *Ans.*
4
44)176
176
4801)4801
4801

30. $1\dot{6}7\dot{7}7\dot{2}1\dot{6}(4096.$ *Ans.*
16
809)7772
7281
8186)49116
49116

31. $4\dot{3}0\dot{4}6\dot{7}2\dot{1}(6561.$ *Ans.*
36
125)704
625
1306)7967
7836
13121)13121
13121

32. $3\dot{4}8\dot{6}7\dot{8}4\dot{4}0\dot{1}(59049.$ *Ans.*
25
109)986
981
11804)57844
47216
118089)1062801
1062801

---

* The product of the divisor completed into the figure last placed in the root, cannot *exceed* the *dividend*. (Art. 351. Obs. 1.)

33. $\dot{1}0\dot{7}3.\dot{7}41\dot{8}2\dot{4}$(32.768. *Ans.*
9
62)173
124
647)4974
4529
6546)44518
39276
65528)524224
524224

34. $\sqrt{\frac{256}{1296}}=\frac{16}{36}$, or $\frac{4}{9}$. *Ans.*

35. $\frac{1024}{7776}$=.13168724, nearly
$\sqrt{.13168724}$=.3628. *Ans.*

36. $\sqrt{\frac{4096}{46656}}=\frac{64}{216}$, or $\frac{8}{27}$. *Ans.*

37. $\sqrt{\frac{16384}{65536}}=\frac{128}{256}$, or $\frac{1}{2}$. *Ans.*

38. $40\frac{24}{25}=\frac{1024}{25}$,
$\sqrt{\frac{1024}{25}}=\frac{32}{5}$, or $6\frac{2}{5}$. *Ans.*

39. $113\frac{28}{36}=\frac{4096}{36}$,
$\sqrt{\frac{4096}{36}}=\frac{64}{6}$, or $10\frac{2}{3}$. *Ans.*

40. .$\dot{0}0\dot{0}5\dot{3}3\dot{6}1$(.0231. *Ans.*
4
43)133
129
461)461
461

41. .$\dot{0}0\dot{0}3\dot{8}0\dot{2}5$(.0195. *Ans.*
1
29)280
261
385)1925
1925

42. $\frac{4}{\cancel{9}}\times\frac{16}{25}\times\frac{49}{81}\times\frac{\overset{16}{\cancel{144}}}{1}=$
$\frac{50176}{2225}$,
$\sqrt{\frac{50176}{2225}}=\frac{224}{45}$, or $4\frac{44}{45}$. *Ans*

43. $\frac{9}{\cancel{64}}\times\frac{25}{49}\times\frac{81}{121}\times\frac{\overset{64}{\cancel{4096}}}{1}=$
$\frac{1166400}{5929}$,
$\sqrt{\frac{1166400}{5929}}=\frac{1080}{77}$, or $14\frac{2}{77}$. *Ans.*

44. 1.7320508+.

45. 3.46410161+.

46. Given.

47. $(8)^2=64$, sq. of base,
$(6)^2=36$ " perpen.
$\sqrt{100}=10$ yds. *Ans.*

Note.—It is advisable for the learner to draw a diagram representing the parts given and the part required in this and the next seven examples.

48. $(40)^2=1600$ m.
$(30)^2=900$ m.
Sum of squares 2500 m.
$\sqrt{2500}$ m.=50 m. *Ans.*

49. $40\times4=160$ m.
$30\times4=120$ m.
$(160)^2=25600$ m.
$(120)^2=14400$ m.
Sum of sqs. 40000 m.
$\sqrt{40000}$ m.=200 m. *Ans.*

50. $(75)^2=5625$ ft.
$(45)^2=2025$ ft.
Dif. of sqs. 3600 ft.
$\sqrt{3600}$ ft.=60 ft. *Ans.*

51. $(32)^2=1024$ ft.
$(20)^2=\ \ 400$ ft.
Dif. of sqs. $\overline{624}$ ft.
$\sqrt{624}$ ft.$=24.97+$ ft. *Ans.*

52. $(30)^2=900$ r.
$(30)^2=900$ r.
Sum of sqs. $\overline{1800}$ r.
$\sqrt{1800}$ r.$=42.426+$r. *Ans.*

53. $10\times160=1600$ sq. r.
$\sqrt{1600}$ r.$=40$ r. side of F.
$(40)^2=1600$ r.
$(40)^2=1600$ r.
Sum of sqs. $\overline{3200}$ r.
$\sqrt{3200}$ r.$=56.568+$r. *Ans.*

54. $(40)^2=1600$ ft.
$(30)^2=\ \ 900$ ft.
Sum of sqs. $\overline{2500}$ ft.
$\sqrt{2500}=50$ ft. diag. floor.
$(50)^2=2500$ ft.
$(14)^2=\ \ 196$ ft.
Sum of sqs. $\overline{2696}$ ft.
$\sqrt{2696}=51.923+$ ft. diag. to ceiling. *Ans.*

ART. **360.** (p. 319.)

55. Given.

56. $\sqrt{906304}=952$ soldiers.

57. 3840 A.$\times160=614400$ r.
$\sqrt{614400}=783.836+$ r. *Ans.*

58. 3840 A.$\times160=614400$.
$\sqrt{\frac{614400}{4}}=391.918$ r. *Ans.*
Or, $783.836\div2=391.918$r.

59. $465\times465\times9=$
1946025 sq. yds.
$\sqrt{1946025}=1395$ yds. *Ans.*

60. $\sqrt{576}=24$ ft. *Ans.*

61. $80\times160=12800$ r.
$\frac{12800}{2}=6400$.
$\sqrt{6400}=80$ r. wide.
$80\times2=160$ r. long.

62. $160\times160=25600$ rods.
$25600\div4=6400$ r.
$\sqrt{6400}=80$ r. wide.
$80\times4=320$ r. long.

63. $32\times18=576$ sq. r.
$\sqrt{576}=24$ rods. *Ans.*

64. $2^2 : 1^2 :: 60$ m. : Ans.
$4\overline{)60}$
$\overline{15}$ min. *Ans*

65. 4 h. : 16 h. :: $9^2 : (\text{A.})^2$
$16\times81=1296$.
$1296\div4=324$.
$\sqrt{324}=18$ in. d. *Ans.*

66. 16 ft. : 36 ft. :: $(20 \text{ in.})^2 : (\text{Ans.})^2$
36
400
$16\overline{)14400}$
$\sqrt{900}=30$ in. *Ans.*

67. 20 r. : 30 r. :: $(20 \text{ yds.})^2 : (\text{Ans.})^2$.
30
400
$20\overline{)12000}$
$\sqrt{600}=24.4948$ y.$+$ *Ans.*

68. Given.

69. $16\times4=64$;
$\sqrt{64}=8$. *Ans.*

70. $25\times9=225$;
$\sqrt{225}=15$. *Ans.*

71. $36\times25=900$;
$\sqrt{900}=30$. *Ans.*

72. $49\times64=3136$;
$\sqrt{3136}=56$. *Ans.*

73. $81\times64=5184$;
$\sqrt{5184}=72$. *Ans.*

74. $54\times28=1512$;
$\sqrt{1512}=38.8844+$. *Ans.*

75. $96\times45=4320$;
$\sqrt{4320}=65.7267+$. *Ans.*

76. $.16\times.04=.0064$;
$\sqrt{.0064}=.08$. *Ans.*

77. $6.25\times.64=4.0000$;
$\sqrt{4}=2$. *Ans.*

78. $.36\times.09=.0324$;
$\sqrt{.0324}=.18$. *Ans.*

79. $\frac{1}{4}\times\frac{1}{9}=\frac{1}{36}$;
$\sqrt{\frac{1}{36}}=\frac{1}{6}$. *Ans.*

80. $\frac{4}{9}\times\frac{16}{25}=\frac{64}{125}$;
$\sqrt{\frac{64}{125}}=\frac{8}{15}$. *Ans.*

*Or, $\sqrt{\frac{4}{9}}=\frac{2}{3}$; $\sqrt{\frac{16}{25}}=\frac{4}{5}$.
Now $\frac{2}{3}\times\frac{4}{5}=\frac{8}{15}$. *Ans.*

81. $\sqrt{\frac{25}{36}}=\frac{5}{6}$; $\sqrt{\frac{49}{81}}=\frac{7}{9}$;
$\frac{5}{6}\times\frac{7}{9}=\frac{35}{54}$. *Ans.*

82. $\sqrt{\frac{36}{64}}=\frac{6}{8}$; $\sqrt{\frac{16}{100}}=\frac{4}{10}$;
$\frac{6}{8}\times\frac{4}{10}=\frac{24}{80}$, or $\frac{3}{10}$. *Ans.*

83. $\sqrt{\frac{49}{121}}=\frac{7}{11}$; $\sqrt{\frac{81}{144}}=\frac{9}{12}$:
$\frac{7}{11}\times\frac{9}{12}=\frac{63}{132}$, or $\frac{21}{44}$. *Ans.*

CUBE ROOT.

ART. **364.** (p. 322.)

3.
$$\begin{array}{r|l} & \dot{1}72\dot{8}(12.\ \textit{Ans.} \\ & 1 \\ \hline 300 & 728 \\ 60 & \\ 4 & \\ \hline 364 & 728 \end{array}$$

4.
$$\begin{array}{r|l} & 1\dot{3}82\dot{4}(24.\ \textit{Ans.} \\ & 8 \\ \hline 1200 & 5824 \\ 240 & \\ 16 & \\ \hline 1456 & 5824 \end{array}$$

5. 72.

6. 83.

7.
$$\begin{array}{r|l} & \dot{1}95\dot{3}12\dot{5}(125.\ \textit{Ans.} \\ & 1 \\ \hline 300 & 953 \\ 60 & \\ 4 & \\ \hline 364 & 728 \\ \hline 43200 & 225125 \\ 1800 & \\ 25 & \\ \hline 45025 & 225125 \end{array}$$

8. $\sqrt[3]{2}=1.259921+$. *Ans.*

---

* The product of the roots of two or more factors, is equal to the root of their product.

9.
$$\begin{array}{r|l}
 & \dot{2}35\dot{7}94\dot{7}69\dot{1}(1331.\ \textit{Ans.} \\
 & 1 \\ \hline
300 & 1357 \\
90 & \\
9 & \\ \hline
399 & 1197 \\ \hline
50700 & 160947 \\
1170 & \\
9 & \\ \hline
51879 & 155637 \\ \hline
5306700 & 5310691 \\
3990 & \\
1 & \\ \hline
5310691 & 5310691 \\ \hline
\end{array}$$

10.
$$\begin{array}{r|l}
 & 1\dot{2}.16\dot{7}(2.3.\ \textit{Ans.} \\
 & 8 \\ \hline
1200 & 4167 \\
180 & \\
9 & \\ \hline
1389 & 4167 \\ \hline
\end{array}$$

11.
$$\begin{array}{r|l}
 & 9\dot{1}.12\dot{5}(4.5.\ \textit{Ans.} \\
 & 64 \\ \hline
4800 & 27125 \\
600 & \\
25 & \\ \hline
5425 & 27125 \\ \hline
\end{array}$$

12. $\sqrt[3]{\frac{27}{64}}=\frac{3}{4}$. *Ans.*

13. $\sqrt[3]{\frac{125}{729}}=\frac{5}{9}$. *Ans.*

14. *Note.*—First reduce the given fraction to its lowest terms. (Art. 364. Obs. 5.)

$\frac{14)378}{14)1750}=\frac{27}{125}$;

$\sqrt[3]{\frac{27}{125}}=\frac{3}{5}$. *Ans.*

15. $190)\frac{1520}{5130}=\frac{8}{27}$;

$\sqrt[3]{\frac{8}{27}}=\frac{2}{3}$. *Ans.*

16. $\sqrt[3]{\frac{729}{4096}}=\frac{9}{16}$. *Ans.*

17. $\sqrt[3]{\frac{15625}{46656}}=\frac{25}{36}$. *Ans.*

18. $13\frac{2}{3}=13.6666+$;

$\sqrt[3]{13.6666}=2.3908+$. *Ans.*

19. $37\frac{1}{27}=\frac{1000}{27}$;

$\sqrt[3]{\frac{1000}{27}}=\frac{10}{3}$, or $3\frac{1}{3}$. *Ans.*

20.
$$\begin{array}{r|l}
 & \dot{1}09\dot{2}72\dot{7}(103.\ \textit{Ans.} \\
 & 1 \\ \hline
30000 & 092727 \\
900 & \\
9 & \\ \hline
30909 & 92727 \\ \hline
\end{array}$$

21.
$$\begin{array}{r|l}
 & 2\dot{7}05\dot{4}03\dot{6}00\dot{8}(3002.\ \textit{Ans.} \\
 & 27 \\ \hline
27000000 & 054036008 \\
18000 & \\
4 & \\ \hline
27098004 & 54036008 \\ \hline
\end{array}$$

22.
$$\begin{array}{r|l}
 & 16\dot{4}.56\dot{6}59\dot{2}(5.48.\ \textit{Ans} \\
 & 125 \\ \hline
7500 & 39566 \\
600 & \\
16 & \\ \hline
8116 & 32464 \\ \hline
874800 & 7102592 \\
12960 & \\
64 & \\ \hline
887824 & 7102592 \\ \hline
\end{array}$$

23.

```
          122615.327232(49.68. Ans
           64
      4800|58615
      1080|
        81|
      5961|53649
    720300| 4966327
      8820|
        36|
    729156| 4374936
  73804800|  591391232
    119040|
        64|
  73923904|  591391232
```

APPLICATIONS OF THE CUBE ROOT.

ART. 365. (p. 324.)

24.

```
      389017(73 in. Ans.
      343
 14700|46017
   630|
     9|
 15339|46017
```

25. 48228544(364 ft. *Ans.*

```
 27
|21228, &c.
```

26.

```
      1259712(108 ft. Ans.
      1
 30000| 259712
  2400|
    64|
 32464| 259712
```

27. $128 \times 2 \times 2 = 512$;

$\sqrt[3]{512} = 8$ ft. *Ans.*

28. $2150.4 \times 500 = 1075200$.

```
           1075200(102.44 + in.
           1                Ans.
   30000| 075200
     600|
       4|
   30604|  61208
 3121200|13992000
   12240|
      16|
 3133456|12533824
314572800|1458176000
   122880|
       16|
314695696|1258782784
            199393216
```

29. 100×63×231=
1455300 cu. in.

$\dot{1}45\dot{5}30\dot{0}$(113.32+in.
1 *Ans.*
331 | 455
| 331
37299 | 124300
| 111897
3840879 | 12403000
| 11522637
385174684 | 880363000
| 770349368
110013632

30. 2421 ft.×12×7=
203364 cu. ft.

$20\dot{3}36\dot{4}$(58.806+ft.
125 *Ans.*
8764 | 78364
| 70112
1023184 | 8252000
| 8185472
10373378436 | 66528000000
| 62240270616
4287729384

ART. **366.** (p. 325.)

31, 32. Given.

33. $(4 \text{ in.})^3 : (12 \text{ in.})^3$ ::
8 lbs. : Ans.
$(12)^3=1728$; $(4)^3=64$.
8
64)13824
Ans. 216 lbs.

34. $(3 \text{ in.})^3 : (8 \text{ in.})^3$ ::
$6400 : Ans.
6400
512
27)3276800
Ans. $121362.9629+.

35. $(60 \text{ ft.})^3 : (30 \text{ ft.})^3$ ::
12500 cu. ft. : Ans.
12500
27000
216000)337500000
Ans. 1562.5 cu. ft

36. $(12 \text{ ft.})^3 : (20 \text{ ft.})^3$ ::
5 T. : Ans.
5
8000
1728)40000
Ans. 23.14814 T.

37. $(\frac{1}{8} \text{ in.})^3 : (4 \text{ in.})^3$ ::
500 lbs. : Ans.
500
64
$32000 \div \frac{1}{512} =$
16384000, 1 cable,
10
100)163840000, 10 "
20)1638400
Ans. 81920 tons.

38. $(6 \text{ ft.})^3 : (20 \text{ ft.})^3$ ::
30 hhd. : Ans.
30
8000
216)240000
Ans. $1111\frac{1}{9}$ hhds.

ART. 367. (p. 325)

39. Given.

40. $5^3\times3=375$;
$\sqrt[3]{375}=7.211+$ ft. *Ans.*

41. \$1600=8 times \$200.
Then $4^3\times8=512$,
$\sqrt[3]{512}=8$ in. *Ans.*

Or, \$200 : \$1600 : : (4 in.)^3 : (Ans.)^3

1600
64
2|00)102400
$\sqrt[3]{512}$(8 in. *Ans*
512

42. $6^3\times\frac{1}{8}=27$;
$\sqrt[3]{27}=3$ ft. *Ans.*

43. $12^3\times\frac{1}{27}=64$;
$\sqrt[3]{64}=4$ ft. *Ans.*

EQUATION OF PAYMENTS.

ART. 372. (p. 327.)

1, 2. Given.

3. \$50 × 2 m.= 100
100 × 5 m.= 500
150 × 8 m.=1200
\$300)1800
Ans. 6 m.

4. 400 × 0=0 (Art. 372. Ob. 1.)
400 × 4=1600
400 × 8=3200
1200)4800
Ans. 4 mo.

5. 100 × 2= 200
200 × 5=1000
300 × 8=2400
600)3600
Ans. 6 months.

6. 400 × 0= 000
400 × 1= 400
400 × 2= 800
400 × 3=1200
1600)2400
Ans. $1\frac{1}{2}$ yr

7. 600 × 0=0000
300 × 4=1200
300 × 8=2400
1200)3600
Ans. 3 months.

8. 250 × 0=0000
300 × 4=1200
950 × 9=8550
1500)9750
Ans. $6\frac{1}{2}$ months

9. 500 × 0= 000
300 × 1= 300
300 × 2= 600
300 × 3= 900
300 × 4=1200
300 × 5=1500
2000)4500
Ans. $2\frac{1}{4}$ yrs.

10. Given.

ART. 373. (p. 329.)

11. March 10, $200× 0 d.= 0000
April 15, $160×36 = 5760
May 1, $440×52 =22880
$800)28640

The average time from first charge is 36 days.
Therefore, the whole is due Aug. 15th. *Ans.*

12. July 5, $620.25× 0 d.= 0000.00
Aug. 11, $240.56× 37 = 8900.72
Sept. 20, $321.64× 77 =24766.28
Oct. 12, $510.38× 99 =50527.62
Nov. 1, $308.17×119 =36672.23
$2001.00)120866.85

The average time is 60 days.
Therefore, the note must be dated Sept. 3d. *Ans.*

13. March 19, $350 (due July 19,)× 0 d.= 0000
April 1, $430 (" Aug. 8,) ×20 = 8600
May 16, $540 (" Aug. 19,)×31 =16740
June 10, $730 (" Sept. 10,)×53 =38690
$2050)64030

From July 19th the average time is 31 days.
Therefore, the whole is due Aug. 19th. *Ans.*

14. May 10, $375.63× 0 d.= 0000.00
" 18, $738.45× 8 = 5907.60
June 3, $860.40×24 =20649.60
" 17, $692.38×38 =26310.44
July 3, $379.68×54 =20502.72
" 12, $417.13×63 =26279.19
$3463.67)99649.55

From May 10th the average time is 29 days.
Therefore, the whole is due Sept. 6th. *Ans.*

15. June 10, $485, (due July 10,)× 0 d.= 0000
" 3, $380, (" Sept. 1,) × 53 =20140
July 21, $834, (" Sept. 19,)× 71 =59214
" 27, $573, (" Nov. 14,)×127 =72771

(carried forward.)

Aug. 2, $485, (" Oct. 21,) ×103 =49955
$2757 2757)202080

From July 10th the average time is 73 days. Therefore, the whole is due Sept. 21st. *Ans.*

16. Sept. 5, $1163.25× 0 *d.*= 0000.00
" 20, $2368.41×15 = 35526.15
Oct. 7, $3561.34×32 =113962.88
" 23, $ 840.90×48 = 40363.20
Nov. 13, $1307.63×69 = 90226.47
$9241.53)280078.70

From Sept. 5th the average time is 30 days. Therefore, the note must be dated Oct. 5th. *Ans.*

ART. **374.** (p. 330.)

18. $1500−$600=$900 bal.
$350×6=2100
$150×4= 600
$100×3= 300
900)3000
Ans. 3⅓ mos.

19. $2100−$1500=$600, bal.
$470×90=42300
$330×60=19800
$700×30=21000
600)83100
Ans. 138½ d.
Or, (Art. 373. Obs. 3.) 139 d.

20. $1835−$1225=$610, bal.
$325×4=1300
$370×3=1110
$530×2=1060
610)3470
Ans. 5 m. 20 d.

21. $16280−$8256=
$8024, bal. unpaid.
$1235×16=19760
$2017×12=24204
$3269× 9=29421
$1735× 7=12145
8024)85530
Ans. 10 m. 19 d.

ART. **376.** (p. 331.)

23. Dr. *A. B. in account with C. D.* Cr.

1853.			1853.		
July 16,	For Merchandise,	$350	Aug. 1,	By stock.	$260
Aug. 11,	" "	460	Sept 30,	" grain,	340
Sept. 9,	" "	570	Oct. 5.	" cash,	500
" 14,	" "	840	" 21,	" "	625
Oct. 18,	" "	780			

What is the balance due Jan. 1st, 1854, at 7 per ct. int.?

Operation.

Drs.	Crs.
$350.00 × 169 *d.* = 59150	$260.00 × 153 *d.* = 39780
460.00 × 143 *d.* = 65780	340.00 × 93 *d.* = 31620
570.00 × 114 *d.* = 64980	500.00 × 88 *d.* = 44000
840.00 × 109 *d.* = 91560	625.00 × 72 *d.* = 45000
780.00 × 75 *d.* = 58500	Int. 31.188 6|000)160|400
nt. 66.104 6|000)339|970	$1756.188 amt. 6)26.733
$3066.104 amt. 6)56.661	4.455
1756.188 9.443	Int. $31.188
$1309.916 *Ans.* $66104 int.	

PARTNERSHIP.

ART. 378. (p. 332.)

2. $600 × 480 = $288000; 288000 ÷ 2400 = $120, A's share
$800 × 480 = $384000; 384000 ÷ 2400 = $160, B's "
$1000 × 480 = $480000; 480000 ÷ 2400 = $200, C's "
$2400 Amt. of stock.

3. Each man's stock in this case is the money he has lent, or the credit he has given to the bankrupt; and the gain is the amount of the bankrupt's property.

$1200 × 5600 = $6720000; 11400)6720000
589.473\frac{78}{114}$, A's
$2300 × 5600 = $12880000; 11400)12880000
1129.824\frac{64}{114}$, B's
$3400 × 5600 = $19040000; 11400)19040000
1670.175\frac{50}{114}$, C's
$4500 × 5600 = $25200000; 11400)25200000
$11400 Amt. of stock.
2210.526\frac{36}{114}$, D's

4. $30 + $40 + $60 + $70 = $200, whole purse.
$30 × 2000 ÷ 200 = $300, A's share,
$40 × 2000 ÷ 200 = $400, B's "
$60 × 2000 ÷ 200 = $600, C's "
$70 × 2000 ÷ 200 = $700, D's "

ART. **379.** (p. 333.)

6. $500 × 4 = $2000; $\frac{2000}{6800}=\frac{5}{17}$, A's fractional share,
$400 × 6 = $2400; $\frac{2400}{6800}=\frac{6}{17}$, B's " "
$800 × 3 = $2400; $\frac{2400}{6800}=\frac{6}{17}$, C's " "
Sum of prods. $6800
$340 × $\frac{5}{17}$ = $100, A's share of gain,
$340 × $\frac{6}{17}$ = $120, B's " "
$340 × $\frac{6}{17}$ = $120, C's " "

7. *Note.*—A's stock in trade is 120 sheep, B's 180 sheep, and the whole loss $60.
120 × 6 = 720; $\frac{720}{1440}=\frac{1}{2}$, A's fractional share.
180 × 4 = 720; $\frac{720}{1440}=\frac{1}{2}$, B's " "
Sum of prods. 1440
$60 × $\frac{1}{2}$ = $30, A's share of expense,
$60 × $\frac{1}{2}$ = $30, B's " "

8. $85 × 8 = $ 680; $\frac{680}{4180}=\frac{34}{209}$, A's fractional share,
$250 × 6 = $1500; $\frac{1500}{4180}=\frac{75}{209}$, B's " "
$500 × 4 = $2000; $\frac{2000}{4180}=\frac{100}{209}$, C's " "
Sum of prods. $4180
$246 × $\frac{34}{209}$ = 40.019\frac{29}{209}$, A's share of loss,
$246 × $\frac{75}{209}$ = 88.277\frac{107}{209}$, B's " "
$246 × $\frac{100}{209}$ = 117.703\frac{73}{209}$, C's " "

9. $54 ÷ 6 = $ 9, A's gain in 1 m. $\frac{9}{19}$ = A's frac. share of stock
$40 ÷ 4 = $10, B's " " $\frac{10}{19}$ = B's " "
Prods. $19
$800 × $\frac{9}{19}$ = $378.95, A's stock,
$800 × $\frac{10}{19}$ = $421.05, B's " } *Ans.*

MEDIAL ALLIGATION.

ART. **382.** (p. 335.)

2. 72 lbs. at 6d. = 432d.
110 lbs. at 8d. = 880d.
95 lbs. at 10d. = 950d.
277 lbs.)2262d.
Ans. 8$\frac{46}{277}$d.

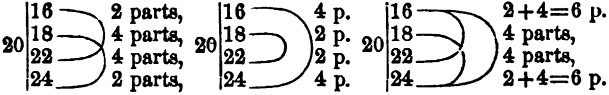
3. 5 lbs. × 22 car. = 110
2$\frac{3}{12}$ lbs. × 20 car. = 45
1$\frac{7}{12}$ lbs. × 18 car. = 28$\frac{1}{2}$
8$\frac{10}{12}$ lbs.)183$\frac{1}{2}$
Ans. 20$\frac{41}{53}$ car. fine.

4. 45 horses × \$87 = \$3915
64 oxen × \$48 = \$3072
$\underline{71}$ cows × \$28 = \$1988
180 $\underline{100}$ gain.
180)$\overline{\$9075}$
Ans. \$$50.41\frac{2}{3}$ apiece.

ALTERNATE ALLIGATION

ART. 384. (p. 336.)

6. *First*, *Second*, *Third operation.*



4th.) 2 parts at 16 car. fine,	5th.) 4 parts at 16 car. fine,
6 " " 18 " "	6 " " 18 " "
6 " " 22 " "	2 " " 22 " "
2 " " 24 " "	6 " " 24 " "
6th.) 6 parts at 16 car. fine,	7th.) 6 parts at 16 car. fine,
2 " " 18 " "	6 " " 18 " "
6 " " 22 " "	6 " " 22 " "
4 " " 24 " "	6 " " 24 " "

7. 2 lbs. at 9 cts.; 2 lbs. at 11 cts.; and 4 lbs. at 14 cts. *Ans.*

8\.

1st.	2d.	3d.
2 lbs. at 15 cts.	3 lbs. at 15 cts.	5 lbs. at 15 cts.
3 " " 18 cts.	2 " " 18 cts.	3 " " 18 cts.
4 " " 21 cts.	1 " " 21 cts.	4 " " 21 cts.
1 " " 22 cts.	4 " " 22 cts.	5 " " 22 cts.

4th.	5th.
2 lbs. at 15 cts.	3 lbs. at 15 cts.
5 " " 18 cts.	5 " " 18 cts.
5 " " 21 cts.	1 " " 21 cts.
1 " " 22 cts.	5 " " 22 cts.

6th.	7th.
5 lbs. at 15 cts.	5 lbs. at 15 cts.
2 " " 18 cts.	5 " " 18 cts.
5 " " 21 cts.	5 " " 21 cts.
4 " " 22 cts.	5 " " 22 cts.

9. 1st.
3 yds. at 68 cts.
5 " " 75 cts.
12 " " 83 cts.
5 " " 85 cts.

2d.
5 yds. at 68 cts.
3 " " 75 cts.
5 " " 83 cts.
12 " " 85 cts.

3d.
8 yds. at 68 cts.
5 " " 75 cts.
12 " " 83 cts.
17 " " 85 cts.

4th.
3 yds. at 68 cts.
8 " " 75 cts.
17 " " 83 cts.
5 " " 85 cts.

5th.
5 yds. at 68 cts.
8 " " 75 cts.
5 " " 83 cts.
17 " " 85 cts.

6th.
8 yds. at 68 cts.
3 " " 75 cts.
17 " " 83 cts.
12 " " 85 cts.

7th.
8 yds. at 68 cts.
8 " " 75 cts.
17 " " 83 cts.
17 " " 85 cts.

ART. 385. (p. 337.)

11. 1st *Operation.* Differences, 2, 9, 8, and 3. Then,
2 : 9 :: 20 : gals. at 25 cts., or 90 gals.
2 : 8 :: 20 : " " 30 cts., or 80 gals. *Ans.*
2 : 3 :: 20 : " " 37 cts., or 30 gals.

2d *Operation.* Differences, 9, 2, 3, and 8. Then,
9 : 2 :: 20 : gals. at 25 cts., or $4\frac{4}{9}$ gals.
9 : 3 :: 20 : " " 30 cts., or $6\frac{2}{3}$ gals. *Ans.*
9 : 8 :: 20 : " " 37 cts., or $17\frac{7}{9}$ gals.

3d *Operation.* Differences, 11, 9, 8, and 11. Then,
11 : 9 :: 20 : gals. at 25 cts., or $16\frac{4}{11}$ gals.
11 : 8 :: 20 : " " 30 cts., or $14\frac{6}{11}$ gals. *Ans.*
11 : 11 :: 20 : " " 37 cts., or 20 gals.

4th *Operation.* Differences, 2, 11, 11, and 3. Then,
2 : 11 :: 20 : gals. at 25 cts., or 110 gals.
2 : 11 :: 20 : " " 30 cts., or 110 gals. *Ans.*
2 : 3 :: 20 : " " 37 cts., or 30 gals.

5th *Operation.* Differences, 9, 11, 3, and 11. Then,
9 : 11 :: 20 : gals. at 25 cts., or $24\frac{4}{9}$ gals.
9 : 3 :: 20 : " " 30 cts., or $6\frac{6}{9}$ gals. *Ans.*
9 : 11 :: 20 : " " 37 cts., or $24\frac{4}{9}$ gals.

6th *Operation.* Differences, 11, 2, 11, and 8. Then,
11 : 2 :: 20 : gals. at 25 cts., or $3\frac{7}{11}$ gals.
11 : 11 :: 20 : " " 30 cts., or 20 gals. } *Ans.*
11 : 8 :: 20 : " " 37 cts., or $14\frac{6}{11}$ gals.

7th *Operation.* Differences, 11, 11, 11, and 11. Then,
11 : 11 :: 20 : gals. at 25 cts., or 20 gals.
11 : 11 :: 20 : " " 30 cts., or 20 gals. } *Ans.*
11 : 11 :: 20 : " " 37 cts., or 20 gals.

12. 1st *Operation.* Differences, 6, 15, 10, and 5. Then,
6 : 15 :: 25 : bu. at 45 cts., or $62\frac{1}{2}$ bu.
6 : 10 :: 25 : " " 56 cts., or $41\frac{2}{3}$ bu. } *Ans.*
6 : 5 :: 25 : " " 65 cts., or $20\frac{5}{6}$ bu.

2d *Operation.* Differences, 15, 6, 5, and 10. Then,
15 : 6 :: 25 : bu. at 45 cts., or 10 bu.
15 : 5 :: 25 : " " 56 cts., or $8\frac{1}{3}$ bu. } *Ans.*
15 : 10 :: 25 : " " 65 cts., or $16\frac{2}{3}$ bu.

3d *Operation.* Differences, 21, 15, 10, and 15. Then,
21 : 15 :: 25 : bu. at 45 cts., or $17\frac{18}{21}$ bu.
21 : 10 :: 25 : " " 56 cts., or $11\frac{19}{21}$ bu. } *Ans.*
21 : 15 :: 25 : " " 65 cts., or $17\frac{18}{21}$ bu.

4th *Operation.* Differences, 6, 21, 15, and 5. Then,
6 : 21 :: 25 : bu. at 45 cts., or $87\frac{3}{6}$ bu.
6 : 15 :: 25 : " " 56 cts., or $62\frac{3}{6}$ bu. } *Ans.*
6 : 5 :: 25 : " " 65 cts., or $20\frac{5}{6}$ bu.

5th *Operation.* Differences, 15, 21, 5, and 15. Then,
15 : 21 :: 25 : bu. at 45 cts., or 35 bu.
15 : 5 :: 25 : " " 56 cts., or $8\frac{1}{3}$ bu. } *Ans.*
15 : 15 :: 25 : " " 65 cts., or 25 bu.

6th *Operation.* Differences, 21, 6, 15, and 10. Then,
21 : 6 :: 25 : bu. at 45 cts., or $7\frac{3}{21}$ bu.
21 : 15 :: 25 : " " 56 cts., or $17\frac{18}{21}$ bu. } *Ans.*
21 : 10 :: 25 : " " 65 cts., or $11\frac{19}{21}$ bu.

7th *Operation.* Differences, 21, 21, 15, and 15. Then
21 : 21 :: 25 : bu. at 45 cts., or 25 bu.
21 : 15 :: 25 : " " 56 cts., or $17\frac{6}{7}$ bu. } *Ans.*
21 : 15 :: 25 : " " 65 cts., or $17\frac{6}{7}$ bu.

ART. 386. (p. 338.)

14. Sum of differences $=20+20+45=85$. Then,

85 : 20 :: 100 : bu. at 25 cts., or $23\frac{9}{17}$ bu.
85 : 20 :: 100 : " " 50 cts., or $23\frac{9}{17}$ bu. *Ans.**
85 : 45 :: 100 : " " 80 cts., or $52\frac{16}{17}$ bu.

15. Sum of differences $=8+8+8+21=45$. Then,

45 : 8 :: 50 : lbs. at 75 cts., or $8\frac{8}{9}$ lbs.
45 : 8 :: 50 : " " 80 cts., or $8\frac{8}{9}$ lbs. *Ans.**
45 : 8 :: 50 : " " 85 cts., or $8\frac{8}{9}$ lbs.
45 : 21 :: 50 : " " 95 cts., or $23\frac{1}{3}$ lbs.

16. 1st. Sum of differences $=5+13+20+8=46$. Then,

46 : 5 :: 750 : lbs. at 50 cts., or $81\frac{12}{23}$ lbs.
46 : 13 :: 750 : " " 62 cts., or $211\frac{22}{23}$ lbs. *Ans.*
46 : 20 :: 750 : " " 75 cts., or $326\frac{2}{23}$ lbs.
46 : 8 :: 750 : " " 83 cts., or $130\frac{10}{23}$ lbs.

2d. Sum of differences $=13+5+8+20=46$. Then,

46 : 13 :: 750 : lbs. at 50 cts., or $211\frac{22}{23}$ lbs.
46 : 5 :: 750 : " " 62 cts., or $81\frac{12}{23}$ lbs. *Ans.*
46 : 8 :: 750 : " " 75 cts., or $130\frac{10}{23}$ lbs.
46 : 20 :: 750 : " " 83 cts., or $326\frac{2}{23}$ lbs.

3d. Sum of differences $=18+13+20+28=79$. Then,

79 : 18 :: 750 : lbs. at 50 cts., or $170\frac{70}{79}$ lbs.
79 : 13 :: 750 : " " 62 cts., or $123\frac{33}{79}$ lbs. *Ans.*
79 : 20 :: 750 : " " 75 cts., or $189\frac{69}{79}$ lbs
79 : 28 :: 750 : " " 83 cts., or $265\frac{65}{79}$ lbs.

4th. Sum of differences $=5+18+28+8=59$. Then,

59 : 5 :: 750 : lbs. at 50 cts., or $63\frac{33}{59}$ lbs.
59 : 18 :: 750 : " " 62 cts., or $228\frac{48}{59}$ lbs. *Ans.*
59 : 28 :: 750 : " " 75 cts., or $355\frac{55}{59}$ lbs.
59 : 8 :: 750 : " " 83 cts., or $101\frac{41}{59}$ lbs.

5th. Sum of differences $=13+18+8+28=67$. Then,

67 : 13 :: 750 : lbs. at 50 cts., or $145\frac{35}{67}$ lbs.
67 : 18 :: 750 : " " 62 cts., or $201\frac{33}{67}$ lbs. *Ans.*
67 : 8 :: 750 : " " 75 cts., or $89\frac{37}{67}$ lbs.
67 : 28 :: 750 : " " 83 cts., or $313\frac{31}{67}$ lbs.

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* In these examples there is but one ingredient whose price is *greater* than that of the mixture; consequently there is but one way of connecting them.

6th. Sum of differences $=18+5+28+20=71$. Then,

71 : 18 :: 750 : lbs. at 50 cts., or $190\frac{10}{71}$ lbs.
71 : 5 :: 750 : " " 62 cts., or $52\frac{58}{71}$ lbs.
71 : 28 :: 750 : " " 75 cts., or $295\frac{55}{71}$ lbs.
71 : 20 :: 750 : " " 83 cts., or $211\frac{19}{71}$ lbs. } *Ans.*

th. Sum of differences $=18+18+28+28=92$. Then,

92 : 18 :: 750 : lbs. at 50 cts., or $146\frac{17}{23}$ lbs.
92 : 18 :: 750 : " " 62 cts., or $146\frac{17}{23}$ lbs.
92 : 28 :: 750 : " " 75 cts., or $288\frac{6}{23}$ lbs.
92 : 28 :: 750 : " " 83 cts.. or $288\frac{6}{23}$ lbs. } *Ans.*

REDUCTION OF CURRENCIES.

ART. 391. (p. 340.)

1, 2. Given.

Note.—It is often more convenient to take the legal value of a pound sterling ($4.84) for the multiplier. In such cases, the product is always to be considered as dollars and cents, the same as if the value of a pound had been taken for the multiplicand. (Art. 45. Obs. 2.)

3. £100, 5s.=£100.25
$4.84
$485.2100 *Ans.*

4. $1334.63.

5. $2179.815.

6. £368, 16s. 4d. 2 far.=
£368.81875
$4.84
$1785.0827500. *Ans.*

7. £591, 12s. 8d. 1 far.=
£591.634375
$4.84
$2863.51037500. *Ans.*

8. £463, 13s. 6d. 3 far.=
£463.678125
$4.84
$2244.20212500. *Ans.*

9. £623, 17s. 9d. 2 far.=
£623.8896
$4.84
$3019.625664. *Ans.*

10. £703, 11s. 4d. 1 far.=
£703.56771
$4.84
$3405.2677164. *Ans*

11. 8763 francs,
$.186
$1629.918. *Ans.*

12. 2365 roubles × $.75=
$1773.75. *Ans.*

13. 9271 flor. × $.485=
$4496.435. *Ans.*

14. 6235 taels × $1.48=
$9227.80. *Ans.*

ART. 392. (p. 340.)

15. Given.
16. £100, 10s. *Ans.*
17. £300. *Ans.*
18. \$16256.75÷\$4.84=
£3358.83264, or
£3358, 16s. 7d. 3.3 f. *Ans.*

19. \$20273.375÷\$4.84=
£4188.713843, or
£4188, 14s. 3d. 1.28928 f. *Ans.*
20. \$50375.625÷\$4.84=
£10408.18698, or
£10408, 3s. 8d. 3.5 far. *Ans.*
21. \$125370.84÷\$4.84=
£25903.066, or
£25903, 1s. 3d. 3.36 far. *Ans.*
22. \$2564÷\$.186=
13784.946 francs. *Ans.*
23. \$8256÷\$.186=
44387.0967 francs. *Ans.*
24. \$3265÷.40=8162.5 flor.
25. \$7264÷.75=$9685\frac{1}{3}$ roub.

ART. 393. (p. 341.)

26. Given.
27. £113, 8s.
28. \$565.75×6=
20)3394.50
£169, 14s. 6d. *Ans.*
29. £186, 3s. 7.2d.
30 \$875.50×8=
20)7004.00
£350, 4s. *Ans.*
31. £240.
32. \$950.60×$4\frac{2}{3}$=
20)$4436.13\frac{1}{3}$
£221, 16s. 1.6d. *Ans.*
33. \$1000×5=5000, and
5000÷20=£250. *Ans.*
Or, \$1000×$\cancel{5}$÷$\cancel{20}$, 4=
£250. *Ans.*
34. \$25.78×$\cancel{5}$÷$\cancel{20}$, 4=
£644. 10s. *Ans.*

ART. 394.

35. Given.
36. £48, 15s. 4d.=$975.33\frac{1}{3}$s.
6)$975.33\frac{1}{3}$
\$$162.55\frac{5}{9}$. *Ans.*
37\. £73, 4s. 5d.=$1464.416\frac{2}{3}$s.
6)$1464.416\frac{2}{3}$
\$$244.069\frac{4}{9}$. *Ans.*
38. £100, 18s. 3d.=2018.25s.
8)2018.25
\$$252.28\frac{1}{8}$. *Ans.*
39\. £256, 5s. $2\frac{1}{2}$d.=
$5125.2083\frac{1}{3}$s.
8)$5125.2083\frac{1}{3}$
\$640.65104. *Ans.*
40\. \$$790.93\frac{1}{3}$.
41. \$$1147.73\frac{1}{3}$.
42\. £568, 10s.=11370s.
$4\frac{2}{3}$)11370
\$$2436.428\frac{4}{7}$. *Ans.*
43. £1000, 15s. 4d.=
$20015.33\frac{1}{3}$s.
5)$20015.33\frac{1}{3}$
\$$4003.06\frac{2}{3}$. *Ans.*

INLAND OR DOMESTIC EXCHANGE.

ART. **400.** (p. 343.)

2. $8278 × .025 = $206.95.
8278.00
206.95
$8071.05. *Ans.*

3. $1127.500 × $.01\frac{1}{4}$ =
14.09375
$1141.59375. *Ans.*

4. 378 × 500 = 189000 lbs.
189000
.08
$15120.00 × .025 =
$378.00 com.
$14742.00 × .01 =
$147.42 prem.
$14889.42. *Ans.*

5. 876 × $35\frac{1}{2}$ = 31098 yd.
31098
$$4.87\frac{1}{2}$ per yd.
$151602.75, price.
$.05\frac{1}{2}$ com. & guar
$8338.15125
$69.50 freight.
$35.15 insurance.
$8442.80125 expenses.
$151602.75
8442.80125
$143159.94875 draft.
$.01\frac{1}{2}$ per ct.
$2147.3992312
143159.94875
$145307.34798. *Ans.*

FOREIGN EXCHANGE

ART. **402.** (p. 345.)

2. £1568, 5s. =
£1568.25
$4.84\frac{4}{9}$
$7597.30. *Ans.*

Or, £1568.25 × $\frac{40}{9}$
40
9)62730.00
6970.00 × .09 =
627.30
$7597.30. *Ans.*

3. £2573, 15s. 8d. =
£2573.783
$4.86\frac{2}{3}$
$12525.74393. *Ans.*

Or, £2573.783
40
9)102951.320
11439.035 × $.09\frac{1}{2}$ =
1086.708
$12525.743. *Ans.*

4. £3181, 7s. 6d.=
£3181.375
4.88$\frac{8}{9}$
\$15553.388$\frac{8}{9}$. *Ans.*

Or, £3181.375
40
9)127255.000
14139.444$\frac{4}{9}$ × .10=
4413.944$\frac{4}{9}$
\$15553.388$\frac{8}{9}$. *Ans.*

ART. **403.** (p. 345.)

5. Given.

6. 4.8444)\$1560.7500000
£322.176
Ans. £322, 3s. 6d. 1 far.

7. 4.8888)\$4368.500000
£893.573
Ans. £893, 11s. 5d. 2 far.

8. 4.8222)\$5280.600000
£1095.06
Ans. £1095, 1s. 2d, 1 far.

9. 4.8555)\$56000.0000000
£11533.312
Ans. £11533, 6s. 2d. 3 far.

10. £1, 8s. 6d =£1.425
1.425
2560 bbls.
£3648.000 × .02=
72.96 com.
£3575.04
4.80, exchange
\$17160.192. *Ans.*

12. 1000 × 360=360000 lbs.
8$\frac{1}{2}$d.
Price, 3060000d.
360000 × $\frac{7}{8}$d.=315000d.
3060000 × .02$\frac{1}{2}$= 76500d.
Expenses, 391500d.
12 × 20=240)2668500d.
£11118 75
4.82$\frac{2}{9}$
Ans. \$53617.0833

ART. **404.** (p. 346.)

14. 5.16)10640.00 fr.
Ans. \$2062.0155

15. 5.20)25265.00 fr.
Ans. \$4858.6538

16. 5.165)68432.000 fr.
Ans. \$13249.177

ARITHMETICAL PROGRESSION.

ART. **413.** (p. 347.)

2. (36+4)÷2=20
No. of terms, 9
Ans. 180

3. (24+1)÷2=12$\frac{1}{2}$
No. of terms, 24
Ans. 300

ART. **415.** (p. 348.)

4. Given.

5. $(19-3)\div 8=2$ com. dif.
$(19+3)\div 2=11$;
$11\times 9=99$ sum of series.

ART. **416.**

6. Given.

7. $(\$45-\$3)\div 3=\$14$;
$14+1=15$ days,
$(\$45+\$3)\div 2=\$24$;
$\$24\times 15=\$360$. *Ans.*

ART. **417.**

8. Given.

9. $(1924\times 2)\div 26=148$;
$148-27=121$. *Ans.*

GEOMETRICAL PROGRESSION.

ART. **419.** (p. 349.)

1. Given.

2. $(\frac{1}{3})^4=\frac{1}{81}$; then,
$48\times\frac{1}{81}=\frac{48}{81}$, or $\frac{16}{27}$. *Ans.*

3. $(4)^6=4096$; then,
$3\times 4096=12288$. *Ans.*

4. $(2)^{22}=4194304$; then,
$2\times 4194304=8388608$. *Ans.*

5. $(2)^{11}=2048$; then,
$1\times 2048=2048$. *Ans.*

6. Amt. of \$1 for 1 yr.$=1.06$;
$(1.06)^4=1.26247696$
Prin. 225
Ans. \$284.05731600
(Art. 419. Obs.)

7. Amt. of \$1 for 1 yr.$=1.07$;
$(1.07)^5=1.4025517307$
Prin. 310.50
Ans. \$435.492312382350

ART. **420.** (p. 350.)

8. $972\times 3=2916$;
$(2916-4)\div 2=1456$.

9. $(2)^8=256$,
$256\times 3=768$ greatest term
$768\times 2=1536$;
$(1536-3)\div 1=1533$. *Ans.*

10. $48144\times 1\frac{1}{4}=60180$;
$(60180-24)\div\frac{1}{4}=$
240624. *Ans.*

11. $\frac{1}{2}\times 2=1$; $1\div 1=1$. *Ans.*

12. $\frac{1}{3}\times 3=1$; $1\div 2=\frac{1}{2}$. *Ans.*

13. $.1\times 10=1$; $1\div 9=\frac{1}{9}$. *Ans.*

14. $3\times 4=12$ sq. r.
$(4)^{11}=4194304$; then,
$4194304\times .01=$
\$41943.04 greatest t.
$\$41943.04\times 4=$
\$167772.16,
$\$167772.16-.01=$
\$167772.15,
$\$167772.15\div 3=$
\$55924.05. *Ans.*

15. $(2)^{11}=2048$; then,
$2048\times 2=4096$;
$4096-1=4095$s.
Ans. £204, 15s.

MENSURATION.

ART. **425.** (p. 351.)

2. $800\times128=102400$ r.
$102400\div160=640$ A. *Ans.*

3. $65\times65=4225$ sq. r.
$4225\div160=26$ A. 65 r. *Ans.*

4. $3750\div75=50$ r. *Ans.*

5. $160\times160=25600$ r.
$25600\div320=80$ r. *Ans.*

ART. **427.** (p. 352.)

6. Given.

7. $28.6\times25=715$ r.
715r$\div160=4$ A. 75 r. *Ans.*

ART. **429.**

8. Given.

9. $25+37=62$; $62\div2=31$,
$31\times18=558$ rods. *Ans.*

ART. **430.**

10. Given.

11. $156\times31\frac{1}{2}$ ($\frac{1}{2}$ of 63)$=$
4914 sq. ft. *Ans.*

ART. **431.**

12. Given.

13. $12+12+12=36$ yds.
$36\div2=18$ yds.
$18-12=6$, 1st r.
$18-12=6$, 2d r.
$18-12=6$, 3d r.
$18\times6\times6\times6=3888$ yds.
$\sqrt{3888}=62.35+$ yds. *Ans.*

ART. **433.** (p. 353.)

14. Given.

15. $3.14159\times100=$
314.159 r. *Ans.*

ART. **434.**

16. Given.

17. $628.318\div3.14159=$
200 yds. *Ans.*

ART. **435.**

18. Given.

19. $(120)^2=14400$.
$14400\times.7854=$
11309.76 sq. rods. *Ans.*

20. First find the diameter, which is 50.929624+; then half the diameter, viz. $25.464812\times80=2037.18496+$ yds. *Ans.*

21. Dividing the area, 50.2656 sq. r. by .7854, we have 64 r., (Art. 434. Obs.) and $\sqrt{64}=8$ rods.

22. $201.0624\div.7854=256$ s.f.
$\sqrt{256}=16$ feet. *Ans.*

ART. **438.**

23. Given.

24. $100\times15\frac{1}{2}=1550$ ft.
$1550\times3\frac{1}{2}=5425$ cu. ft. *Ans.*

25. $\sqrt[3]{19683}=27$ ft. *Ans.*

26. $60\times3\frac{1}{3}=200$ ft.
$400\div200=2$ ft. *Ans.*

Art. 440. (p. 354.)

27. Given.
28. 460×20=9200 cu. ft.

Art. 441.

29. Given.
30. 2×4=8 ft. perimeter,
19×8=152 sq. ft. *Ans.*

Art. 444. (p. 355.)

31. Given.
32. 30×30=900 sq. ft.
900×.7854=706.86 sq.ft.
90÷3=30 ft. ($\frac{1}{3}$ altitude)
706.86×30=21205.8cu.ft.

Art. 445.

33. Given.
34. 500×60=30000 sq. ft.

Art. 446.

35. Given.
36. 4×4=16; 3×3=9;
16+9=25 sq. ft.
16×9=144;
$\sqrt{144}=12$;
25+12=37;
10÷3=3$\frac{1}{3}$;
37×3$\frac{1}{3}$=123$\frac{1}{3}$ cu.ft. *Ans.*

Art. 449. (p. 358.)

37—39. Given.

40. 3.14159×30=94.24770
94 24770÷2=47.12385
47.12385×15=706.857
706.85775×65=
45945.75375 cu.ft. *Ans.*
Or, 30×30=900,
900×.7854=706.86,
(Art. 435. Obs.)
706.86×65=
45945.9 cu. ft. *Ans.*

Art. 450.

41. Given.
42. 3.14159×20=62.8318ft
62.8318×65=
4084.067 sq. ft. *Ans*

Art. 452.

43. Given.
44. 3.14159×8000=
25132.72 cir.
25132.72×8000=
201061760 sq. m.

Art. 453.

46. 3 14159×8000=
25132.72 cir.
25132.72×8000=
201061760 sur.
8000÷6=1333$\frac{1}{3}$ ($\frac{1}{6}$ dia.)
201061760×1333$\frac{1}{3}$=
268082346666$\frac{2}{3}$ cu. m

GAUGING OF CASKS.

Art. 454. (p. 356.)

47. Given.
48. 42−36=6, dif.
6×.7=4.2;
36+4.2=40.2;
40.2×40.2=1616.04;
1616.04×54=87266.16;
87266.16×.0028=
244.345248+gals. *Ans.*

MISCELLANEOUS EXAMPLES.

1. $\frac{1}{2}=\frac{3}{6}$; $\frac{1}{3}=\frac{2}{6}$,
$\frac{3}{6}+\frac{2}{6}=\frac{5}{6}$;
$\frac{6}{6}-\frac{5}{6}=\frac{1}{6}$,
$\frac{1}{6}=95$; $\frac{6}{6}=570$ sheep.

2. 2)\$15750
2)7875 cost of house,
8)3937.50 cost of barn,
492.1875 " car.
\$3445.3125. *Ans.*

3. $\frac{19}{20}$ of $275=261\frac{1}{4}$;
$\frac{3}{4}$ of $315=236\frac{1}{4}$;
Ans. 25 dif.

4. $\frac{1}{2}-\frac{1}{4}$, or $\frac{1}{4}=387$; then,
$\frac{4}{4}=387\times4=1548$. *Ans.*

5 $\frac{2}{3}=\frac{10}{15}$; $\frac{3}{5}=\frac{9}{15}$;
$\frac{10}{15}+\frac{9}{15}=\frac{19}{15}=255$; then,
$\frac{1}{15}=13\frac{8}{19}$; and
$\frac{15}{15}=201\frac{6}{19}$. *Ans.*

6. $81193\frac{1}{9}-1375\frac{1}{3}=$
$79817\frac{7}{9}$. *Ans.*

7. $1137\frac{1}{5}-793\frac{1}{4}=343\frac{19}{20}$.
Ans.

8. $17\frac{1}{4}=\frac{69}{4}$; $19\frac{1}{2}=\frac{39}{2}$;
$\frac{69}{4}\times\frac{39}{2}=\frac{2691}{8}=336\frac{3}{8}$;
$336\frac{3}{8}-217\frac{1}{2}=118\frac{7}{8}$. *Ans.*

9. $45\frac{1}{5}=\frac{226}{5}$; $288\frac{1}{4}=\frac{1153}{4}$;
$\frac{1153}{4}\div\frac{226}{5}=\frac{5765}{904}=$
$6\frac{341}{904}$. *Ans.*

10. $37\frac{1}{2}=\frac{75}{2}$; $193\frac{1}{4}=\frac{773}{4}$;
$\frac{75}{2}\times\frac{773}{4}=\frac{57975}{8}=$
$7246\frac{7}{8}$. *Ans.*

11. $\frac{4}{5}$ of $\frac{7}{8}=\frac{28}{40}$; $\frac{7}{8}=\frac{35}{40}$;
$\frac{35}{40}-\frac{28}{40}=\frac{7}{40}$. *Ans.*

12. $\$10360\times.01\frac{3}{8}=$
\$142.45. *Ans.*

13. Int. \$6376, 3 mo. at 1 per ct.=\$15.94;
$\$135.49\div\$15.94=8\frac{1}{2}$ per ct. *Ans.*

14. Int. \$1, 3 mo. at 7 per ct.=.0175;
$\$455\div.0175=\$26000$. *Ans.*

15. Int. \$1, for 6 mo. at $6\frac{1}{2}$ per ct.=.0325;
$\$650\div.0325=\$20000$. *Ans.*

16. Int. \$8284, 1 year, at 6 per ct.=\$497.04;
$\$365\div\$497.04=.7343$, yr.
.7343, yr.=8 mo. 24 d. *Ans.*

17. $\$857.25\times.07=\$60.0075$;
$\$857.25\div\$60.0075=14.2857$ yrs.
14 years, 3 months, 12 days. *Ans.*

18. Int. \$500, 10 yrs. at 1 per ct.=\$50;
$\$500\div50=10$ per ct. *Ans.*

19. $\$1365\div\$1.035=\$1318.84\frac{4}{69}$. *Ans.*

20. $\$1623.28\div\$1.06=\$1531.396\frac{12}{53}$. *Ans.*

21. $730×.065=$47.450, discount 1 year,
$47.450÷3=$15.8166⅔, " 4 months,
.3954, " 3 days.
$16.2120. *Ans.*

22. $1575×.07=$110.25, discount 1 year,
18.375, " 2 months,
.91875, " 3 days.
$19.29375. *Ans.*

23. Given.

24. $6300×.03⅓=$210; $6300−$210=$6090. *Ans.*

25. $8500×.01¼=$106.25. *Ans.*

26. $16265×.02½=$406.625. *Ans.*

27. $78.750÷.015=$5250. *Ans.*

28. 1 per cent. of $6544 is $65.44; consequently $24.54 is as many per cent. of $6544, as $65.44 is contained times in $24.54, which is 0.375. Hence, .375, or ⅜ of 1 per cent. is the answer.

29. 1 per cent. of $17250=$172.50;
$862.50÷$172.50=5 per cent. *Ans.*

30. $5640+$258=$5898; $5898×.15=$884.70;
$5898+$884.70=$6782.70. *Ans.*

31. *Note.*—The actual cost of the goods is $4390, increased by interest on this sum for 6 months. Hence, subtracting the interest on the outlay from 22½ per cent. of the same, will give the profit.

$4390×.22½=$987.75., per centage;
$4390×.07÷$2=$153.65, interest 6 months;
$987.75−$153.65=$834.10, profit. *Ans.*

32. 15000 gals.×.01½=225 g.; 15000−225=14775 g.;
$8500×.15=$1275; $1275+$8500=$9775;
$9775÷14775=$.662 per gal. *Ans.*

33. Given.

34. $250×.06=$15.00; $250−$15=$235;
$235÷2500=$.094 per lb. *Ans.*

35. $3−$2.50=$.50; .50÷$2.50=20 *per cent.*
1824×$2.50=$4560 cost; $4560×.20=$912 *gain.*

36. $375−$250=$125; $125÷250=50 *per cent.*
$250×.50=$125 *gain.*

37. $6\frac{1}{2}$ cts. $-\ 4\frac{1}{2}$ c'ts. $=2$ cts.; 2 cts. $\div\ 4\frac{1}{2}$ cts. $=44\frac{4}{9}$ *per cent.*
$3680\times.04\frac{1}{2}=\$165.60$; $\$165.60\times.044\frac{4}{9}=\$73.60$ *gain.*

38. $\$10436\times.33\frac{1}{3}=\$3478.66\frac{2}{3}$. *Ans.*

39. $\$35856\times.15\frac{1}{2}=\$5557.68$. *Ans.*

40. $\$23265\times.37\frac{1}{2}=\$8724.37\frac{1}{2}$. *Ans.*

41. $856-75=781$; $781\div2=390\frac{1}{2}$, the greater;
$390\frac{1}{2}+75=465\frac{1}{2}$, the less.

42. $5643-125=5518$; $5518\div2=2759$, the greater;
$2759+125=2884$, the less.

43. $365+63=428$. *Ans.*

44. $3750\div75=50$. *Ans.*

45. $45\times34=1530$; $\frac{1}{9}=1530\div5=306$; $\frac{9}{9}=2754$. *Ans.*

46. $\frac{3}{4}$ of $120\times63=5670$; $\frac{3}{\cancel{5}}$ of $\frac{\cancel{5}}{8}=\frac{3}{8}$; $\frac{1}{8}=1890$; $\frac{8}{8}=15120$. *Ans.*

47. $52\times5=260$ d.; $260\times6=1560$ hrs.;
$1560\times60=93600$ m.; $93600\times50=4680000$;
$1000000000\div4680000=213\frac{79}{117}$ yrs. *Ans.*

48. 7 lbs. 1 oz. 18 pwts. 18 grs. $=41250$ grs.
$41250\div412.5=100$ dollars. *Ans.*

49. 25000 miles $\times\ 320=8000000$ rods;
$160\div2\frac{1}{2}=64$ rods to 1 oz. silk;
$64\times16=1024$ rods to 1 lb. silk;
$8000000\div1024=7812.5$ lbs. *Ans.*

50. 7 ft. 6 in. $=90$ in. and 7 m. 1 fur. 30 rods $=457380$ in.
$457380\div90=5082$ times. *Ans.*

51. 5 ft. $7\frac{1}{2}$ in. $=67.5$ in.; 7 m. 1 fur. 30 r. $=457380$ in.;
457380 in. $\div\ 67.5=6776$ times. *Ans.*

52. $\frac{2}{3}$ of $8\frac{1}{2}=\frac{17}{3}$; $217\frac{3}{5}=\frac{1088}{5}$; $\frac{1088}{5}\div\frac{17}{3}=38\frac{34}{85}$ oranges.

53. $\frac{9}{10}$ of $245\frac{1}{4}$ A. $=\frac{8829}{40}=220.725$ A.
$\$251.25\div220.725=\$1.1382$ per A. *Ans.*

54. $\frac{1}{2}-\frac{1}{3}=\frac{1}{6}=428$; $\frac{6}{6}=2568$. *Ans.*

55. $\frac{2}{3}+\frac{3}{4}=\frac{8}{12}+\frac{9}{12}=\frac{17}{12}$; $\frac{17}{12}=510$; $\frac{1}{12}=30$; $\frac{12}{12}=360$. *Ans.*

56. Given, \$1573, 3d.
$\$1573\times3=\$4719$, 2d.
$\$4719\times2=\$9438$, 1st.
Ans. \$15730

57. Given, \$ 7860, 2d.
$\$7860\times2=\$15720$, 1st.
$\$7860\div2=\$\ 3930$, 4th.
$\$3930\div2=\$\ 1965$, 3d.
Ans. \$29475

58. $\frac{3}{3}$=whole estate;
$\frac{1}{3}$=portion of eldest;
$\frac{3}{3}-\frac{1}{3}=\frac{2}{3}$, 1st rem.
$\frac{1}{2}$ of $\frac{2}{3}=\frac{1}{3}$, portion of 2d;
$\frac{2}{3}-\frac{1}{3}=\frac{1}{3}$, 2d rem
$\frac{1}{4}$ of $\frac{1}{3}$=\$3560, por. of 3d.
\$3560×4=\$14240, $\frac{1}{3}$ E.
\$14240×3=\$42720.
Ans.

59. $45\frac{3}{4}$ r. $28\frac{4}{5}$ r.
$$\begin{array}{ccc} 4 & & 5 \\ \hline 183 & & \cancel{144},\ 36= \\ \overline{\cancel{4}} & \times & \overline{5} \end{array}$$
$\frac{6588}{5}$ r.=$1317\frac{3}{5}$ rods;
$2\frac{1}{4}$ acres=360 rods;
$\cancel{360}$ r. : $1317\frac{3}{5}$ r. :: \$$\cancel{75}$: A.
$$\begin{array}{lll} 24 & 5 & 5 \\ \hline 24) & 6588 & (\$274.50 \end{array}$$
Ans.

60. $\frac{3}{4}$ of £6, 12s.=1188d.
$\frac{1}{2}$ of 13s. 6d.=81d.
Ans. $\frac{81}{1188}=\frac{3}{44}$d.

61. 3)£276, 15s. 6d.
$$\begin{array}{rrr} 92 & 5 & 2 \\ & & 2 \\ \hline £184, & 10s. & 4d. \\ & & 45\frac{1}{2} \\ \hline £8395, & 10s. & 2d. \end{array}$$
Ans.

62. 735 bbls.×$2\frac{1}{2}=1837\frac{1}{2}$ bu.
1s. 8d.=20d.
$1837\frac{1}{2}$×20=36750d.
36750d.=£153, 2s. 6d.
Ans.

64. 248×£.625=£155. *Ans.*

65. \$15.60÷56=\$.27$\frac{6}{7}$ pr. lb.
.078 T.=156 lbs.
156×\$.27$\frac{6}{7}$=\$43.45$\frac{5}{7}$.
Ans.

66. \$480÷48=\$10 pr. E. Flem.
\$10÷3=\$3$\frac{1}{3}$ pr. qr.
125 E. Eng.×5=625 qrs.
625 qrs.×\$3$\frac{1}{3}$=\$2083$\frac{1}{3}$.
Ans.
Or, $\cancel{144}$ q. : 625 q. :: \$$\cancel{480}$: A.
$$\begin{array}{lll} 12 & 40 & 40 \\ \hline 12) & 25000 & (\$2083\frac{1}{3} \end{array}$$
Ans.

67. 192 T.÷96=2 tons,
1 h. eats in 1 winter.
150×2 =300 T., 150 h.
eat in 1 winter.
300 T.×6=1800 T. *Ans.*

68. .1 c.=10 l., $9\frac{3}{8}$s.=$112\frac{1}{2}$d.
$\frac{3}{25}$ T.=240 lbs.
$$\begin{array}{r} 10)\underline{112.5d.} \\ 11.25d.\text{ pr. lb.} \\ \underline{240\text{ lbs.}} \\ 12)\underline{2700.00d.} \\ 20)\underline{225} \\ £11,\ 5s. \end{array}$$
Ans.

69. $\frac{1}{4}$ cwt.=25 lbs.
\$$1\frac{3}{4}$=\$1.75;
\$1.75÷25=\$.07 per lb.
872 lbs.×.07=\$61.04.

70. .5 cwt.=50 lbs.
$\frac{23}{100}$ T.=460 lbs.
\$$7\frac{1}{7}=\frac{50}{7}$;
$\frac{50}{7}$÷50=\$$\frac{1}{7}$ per lb.
460 lbs.×\$$\frac{1}{7}$=\$65.71$\frac{3}{7}$.

71. 260 loads×96 cu. ft.=
24960 cu. ft.
128)24960(195 cords.
\$$87\frac{3}{5}$=\$87.60,
\$87.60÷45=\$1.94$\frac{2}{3}$ pr. c.
\$1.94$\frac{2}{3}$×195 cords=
\$379 60. *Ans*

72. £1$\frac{1}{2}$=£1, 10s . 0d.
£$\frac{4}{5}$= 0, 16s. 0d.
$\frac{1}{4}$s.= 0, 0s. 3d.
$\frac{5}{8}$s.= 0, 0s. 7$\frac{1}{2}$d.
$\frac{3}{4}$d.= 0, 0s. 0$\frac{3}{4}$d.
Ans. £2, 6s. 11$\frac{1}{4}$d.

73.

	lbs.	oz.	pwts.	grs.
$\frac{3}{4}$ lb =	0	9	0	0
10$\frac{1}{2}$ pwts.=	0	0	10	12
3$\frac{1}{2}$ oz.=	0	3	10	0
10 grs.=	0	0	0	10
Ans.	1	1	0	22

74. 2$\frac{1}{4}$ oz.=2 oz. 5 pwts.
6$\frac{3}{4}$ pwts.=0 6$\frac{3}{4}$ pwts.
Ans. 1 oz. 18$\frac{1}{4}$ pwts.

75. £$\frac{4}{5}$, 2$\frac{1}{2}$s.=18s. 6d.
7$\frac{1}{4}$s. 2$\frac{1}{2}$d.= 7s. 5$\frac{1}{2}$d.
Ans. 11s. $\frac{1}{2}$d.

76. $\frac{7,\ \cancel{63}\times 8\times \cancel{144},\ 16}{\cancel{9}\times\cancel{9}}=$
896 tiles. *Ans.*

77. \$9265÷$\frac{90}{100}$=\$10294.444 cost,
\$12000−\$10294.444=\$1705.556 gain,
\$1705.556÷10294.444=16 per cent. *Ans.*

78. $\frac{2}{3}+\frac{3}{4}+\frac{5}{8}=\frac{49}{24}$; $\frac{1}{24}$=\$4260÷49, or \$86$\frac{46}{49}$;
$\frac{24}{24}$=\$86$\frac{46}{49}$×24, or \$2086$\frac{26}{49}$. *Ans.*

79. 157$\frac{1}{3}$ r.×16$\frac{1}{2}$ ft.
3 2

$$\frac{236,\ \cancel{472}}{\cancel{3}}\times\frac{\cancel{33},\ 11}{\cancel{2}}=2596 \text{ ft.}$$

2596 ft.+4$\frac{1}{2}$ ft.=2600$\frac{1}{2}$ ft.
2600$\frac{1}{2}$×2600$\frac{1}{2}$=6762600$\frac{1}{4}$ sq. ft.
272$\frac{1}{4}$)6762600$\frac{1}{4}$
4 4
1089) 27050401
160)24839 r. 182$\frac{1}{2}$ ft.
155 A. 39 r. 182$\frac{1}{2}$ ft. *Ans.*

80. 25$\frac{2}{5}$ E. e. : 85$\frac{1}{2}$ yds. : : £10, 15s. : Ans.
5 4 20
127 qrs. : 342 qrs. : : 215s. :
215
127)73530
2|0)57|8s. 11$\frac{91}{127}$d.
£28, 18s. 11$\frac{91}{127}$d. *Ans.*

81. $35\frac{2}{5}$ r.$\times16\frac{1}{2}=584.1$ ft. long,
$20\frac{3}{4}$ r.$\times16\frac{1}{2}=342.375$ ft. wide,
584.1 ft.$-$13 ft.$=$571.1 ft. rem.
342 375$-$13 ft.$=$329.375 ft. rem.
571.1 ft.$\times$329.375 ft.$=$188106.0625 sq. ft. area,
$188106.0625\div272\frac{1}{4}=690.931$ sq. r. *Ans.*

82. $15\frac{1}{2}$ yds. : $56\frac{3}{4}$ yds. : : $\$18\frac{3}{4}$: Ans.

$$\begin{array}{r}18\frac{3}{4}\\ 15.5\overline{)1064.0625}\\ \hline \$68.649+\end{array}$$

. *Ans.*

83. 16 oz.$-13\frac{1}{2}$ oz.$=2\frac{1}{2}$oz.; $500\times2\frac{1}{2}=1250$ oz.
$1250\div16=78$ lbs. 2 oz. *Ans.*

84. $\frac{2}{7}$ bbl. : $85\frac{7}{8}$ bbls. : : $\$\frac{4}{5}$: Ans.

$$\frac{7}{2}\times\frac{\overset{8}{\overline{687}}}{\cancel{8},\,2}\times\frac{\cancel{4}}{5}=\frac{4809}{20}\text{, or \$240.45. }\textit{Ans.}$$

Or, If $\frac{2}{7}$ bbl. cost $\$\frac{4}{5}$, $\frac{1}{7}$ bbl. costs $\$\frac{2}{5}$, and $\frac{7}{7}$ or 1 bbl. costs $\$2\frac{4}{5}$.
Now, $85\frac{7}{8}$ bbls.$\times\$2\frac{4}{5}=\$240.45$. *Ans.*

85. $\frac{29}{30}$ T.$=1933\frac{1}{3}$ lbs.; then,
$\frac{7}{15}$ lb. : $1933\frac{1}{3}$ lbs. : : $\frac{14}{17}$s. : Ans.

$$5,\,\frac{\cancel{15}}{\cancel{7}}\times\frac{\overset{3}{\overline{5800}}}{\cancel{3}}\times\frac{\cancel{14},\,2}{17}=\frac{58000}{17}\text{s.}$$

$\frac{58000}{17}$s.$=3411\frac{13}{17}$s., or £170, $11\frac{13}{17}$s. *Ans.*

Or, If $\frac{7}{15}$ lb. cost $\frac{14}{17}$s. $\frac{1}{15}$ lb. will cost $\frac{2}{17}$s. and 1 lb. will cost $\frac{30}{17}$s

Then $\frac{29}{30}$ T., or $\frac{58000}{\cancel{30}}$lb.$\times\frac{\cancel{30}}{17}$s.$=\frac{58000}{17}$s, or £170, $11\frac{13}{17}$s. *Ans.*

86. $\frac{3}{16}$ T.$=\frac{60}{16}$ cwt.; then $\frac{60}{16}$ cwt. : $\frac{19}{20}$ cwt. : : £$\frac{7}{8}$: Ans.

$$\cancel{2},\,\frac{\cancel{16}}{60}\times\frac{19}{\cancel{20},\,10}\times\frac{7}{\cancel{8}}=\text{£}\tfrac{133}{600}\text{, or }4\tfrac{13}{30}\text{s. }\textit{Ans.}$$

Or, $\frac{3}{16}$ T.$=\frac{15}{4}$ cwt.; then $\frac{15}{4}$ cwt. : $\frac{19}{20}$ cwt. : : £$\frac{7}{8}$: Ans.

$$\frac{\cancel{4}}{15}\times\frac{19}{\cancel{20},\,5}\times\frac{7}{8}=\text{£}\tfrac{133}{600};\ \text{£}\tfrac{133}{600}=4\tfrac{13}{30}\text{s. }\textit{Ans.}$$

87. $\frac{3}{4}$ dr. : $\frac{4}{15}$ dr. : : $\$\frac{4}{5}$: Ans.; and $\frac{\cancel{4}}{3}\times\frac{\cancel{4}}{\cancel{5}}\times\frac{\cancel{5}}{\cancel{16}}=\$\frac{1}{3}$. *Ans.*

88. $\$27\frac{3}{8}$: $\$125$ :: $48\frac{1}{3}$ lbs. :: Ans.

8　　　$48\frac{1}{3}$

219 eighths　$6041\frac{2}{3}=\frac{18125}{3}$

$\frac{8}{219}\times\frac{18125}{3}=\frac{145000}{657}=220\frac{460}{657}$ lbs. *Ans.*

89. 9 yds. × 36 in. × 27 in. = 8748 sq. in. or 60.75 sq. ft. in 1 rol.

$18\frac{1}{2}$ ft. × 2 × $12\frac{1}{5}$ = $451\frac{2}{5}$ sq. ft. in 2 sides,

$16\frac{1}{4}$ ft. × 2 × $12\frac{1}{5}$ = $396\frac{1}{2}$ sq. ft. in 2 ends,

60.75)847.90 sq. ft.

Ans. 13.9572 rolls.

90. $\frac{1}{4}-\frac{1}{6}=\frac{1}{12}$.
Now, $\frac{1}{12}=\$3250$, and
$\frac{12}{12}=\$39000$. *Ans.*

91. \$1644 − \$56 = \$1588.
Now, since \$1588 is $\frac{1}{4}$,
$\frac{4}{4}$ is \$1588 × 4 = \$6352.
Ans.

92. $\frac{5}{12}+\frac{1}{3}+\frac{1}{16}=\frac{20}{48}+\frac{16}{48}+\frac{3}{48}$, or $\frac{39}{48}=\frac{13}{16}$.
Now, $\frac{13}{16}$ of 1 d. = $19\frac{1}{2}$ hrs.
$19\frac{1}{2}$ hrs. + $1\frac{1}{2}$ hr. = 21 hrs.
24 hrs. − 21 hrs. = 3 hrs.
Ans.

93. 105 ft. *Ans.*

94. 16 hhds. × 63 = 1008 gals.
75 fir. × 56 = 4200 lbs.
4200 × $\$.16\frac{1}{2}$ = \$693.00,
\$693.00 ÷ 1008 =
\$.6875 per gal. *Ans.*

95. A digs $\frac{1}{45}=\frac{7}{315}$ in 1 day,
B " $\frac{1}{63}=\frac{5}{315}$ " "
$\frac{7}{315}+\frac{5}{315}=\frac{12}{315}$ of cellar both dig in 1 day.
Now, if $\frac{12}{315}$ requires 1 d.,
$\frac{1}{315}$ will require $\frac{1}{12}$ d., and
$\frac{315}{315}$ will require $\frac{1}{12}$ d. ×
315 = $26\frac{1}{4}$ days. *Ans.*

96. 5 A. × 160 r. × $272\frac{1}{4}$ ft. =
217800 ft. area,
$8\frac{1}{2}$ ft. deep,
1851300 cu. ft.
1000 oz.
1851300000 oz.
1 ton = 32000 oz.
32|000)1851300|000
Ans. $57853\frac{1}{8}$ tons.

97. $\frac{11}{16}$ of $\frac{5}{8}=\frac{55}{128}$; and
$\frac{55}{128}$ of \$8400 = \$3609.375
.16
16 per cent. is \$577.50000
3609.375
Ans. \$4186.875.

98. $\frac{2}{3}$ of $\frac{3}{5}=\frac{6}{15}$, or $\frac{2}{5}$ = 176 sh
Now, if 176 is $\frac{2}{5}$, $\frac{1}{5}$ is 176
÷ 2 = 88 sheep, and $\frac{5}{5}$ is
88 × 5 = 440 sheep in all.
440 − 176 = 264 rem., and
264 ÷ 2 = 132 sheep. *Ans.*

99. $\frac{1}{2}+\frac{1}{10}=\frac{6}{10}$, the part eaten, and $\frac{4}{10}$ = part left. Since $\frac{6}{10}$ lasted 108 days, $\frac{1}{10}$ will last $\frac{1}{6}$ of 108 ds., or 18 ds., and $\frac{4}{10}$ will last 4 times 18 ds., which is 72 ds. *Ans.*

100. $1520\times\frac{7}{8}$ lb.=1330 lbs. per day;
416955 lbs.÷1330 lbs.= $313\frac{1}{2}$ days. *Ans.*

101. $119\frac{3}{7}$ hhds.=7524 gals.
$\frac{2}{5}$ gal.×30=12 gals.
7524÷12=627 d. *Ans.*

103. A can saw $\frac{1}{4}$ c. in 1 hr.
B " " $\frac{1}{5}$ c. " 1 hr.
C " " $\frac{1}{6}$ c. " 1 hr.
$\frac{1}{4}+\frac{1}{5}+\frac{1}{6}=\frac{37}{60}$ c. all saw.
Now, if $\frac{37}{60}$ c. requires them all 1 hr., $\frac{1}{60}$ will require $\frac{1}{37}$ hr., and $\frac{60}{60}$ will require $\frac{1}{37}\times60=1\frac{23}{37}$ hr. *Ans.*

104. $22\frac{1}{4}$ ft.$=\frac{89}{4}$ ft.
$216\frac{1}{8}$ ft.$=\frac{1729}{8}$ ft.
$\frac{89}{4}$ ft. : $\frac{1729}{8}$ ft ::1 r : A.
$\frac{\cancel{4}}{89}\times\frac{1729}{\cancel{8},2}\times1=\frac{1729}{178}$ r.
or $9\frac{127}{178}$ r. *Ans.*

105. 120 days.

106. $\frac{2}{3}$ of $37\frac{1}{2}$ yrs.=25 yrs. Hence, 25 yrs. is $\frac{5}{8}$ of B's age. Then $\frac{1}{8}$=25÷5= 5 yrs., and $\frac{8}{8}$=5×8= 40 yrs. *Ans.*

107. $\frac{4}{15}$ of 465 s.=124 sheep. Now, as 124 is $\frac{31}{43}$ of D's, $\frac{1}{43}$=124÷31=4; and $\frac{43}{43}$=4×43=172 s. *Ans.*

108. $\frac{1}{45}$ of 405 is 9, $\frac{21}{45}$=9×21, or 189. Now, if 189 is $\frac{22}{27}$ of a certain number, $\frac{1}{27}$ of it is $\frac{189}{22}$, and $\frac{27}{27}=\frac{189}{22}\times27=\frac{5103}{22}$. But $\frac{5103}{22}\div20=\frac{5103}{440}$, or $11\frac{263}{440}$. Therefore, $\frac{21}{45}$ of 405 is $\frac{22}{27}$ of $11\frac{263}{440}$ times 20. *Ans.*
Proof.—$\frac{21}{45}$ of 405=$18\frac{8}{9}$; and $\frac{22}{27}$ of $11\frac{263}{440}\times20=$ $18\frac{8}{9}$ also.

109. $\frac{1}{64}$ of 768 is 12, and $\frac{35}{64}$=12×35, or 420. Now, as 420 is $\frac{21}{84}$ of a certain number, $\frac{1}{84}$ of that number must be $\frac{1}{21}$ of 420, which is 20, and $\frac{84}{84}$, or the whole number is 20×84, or 1680. Again, $\frac{1}{16}$ of 575 is $\frac{575}{16}$, and $1680\div\frac{575}{16}=1680\times\frac{16}{575}$, or $46\frac{86}{115}$ sixteenths. Therefore, $\frac{35}{64}$ of 768 is $\frac{21}{84}$ of $46\frac{86}{115}$ sixteenths of 575. *Ans*
Proof.—$\frac{35}{64}$ of 768=420; and $\frac{21}{84}$ of $46\frac{86}{115}$ ($\frac{5376}{115}$) of $\frac{1}{16}$ of 576=420 also.

110 $318\frac{1}{40}$ A.×160=50884 sq. r.; √50884=225.585 r.

111 196 A.×160=31360 r.; 31360÷2=15680 r.
√15680=125.219 r. breadth,
2
250.438 r. length. *Ans.*

112 $(160)^2=25600$
$(128)^2=\underline{16384}$
$\sqrt{9216}=96$ r. breadth.
$128\times96=12288$ sq. r.; $12288\div160=76.8$ A. *Ans.*

113. 50 yds.$\times$50$=$2500 yds.
30 yds.$\times$30$=$900 yds.; $2500-900=1600$ yds.
$\sqrt{1600}=40$, base, and $40\times15=600$ yds. *Ans.*

114. 100 r.$\times$100$=$10000 rods,
60 r.$\times$60$=$ $\underline{3600}$ rods.
$\sqrt{6400}=80$ r.
60 rods$\times$40$=$2400 sq. r. *Ans.*

115. $\frac{1}{10}$ of time to midnight$=\frac{1}{8}$ of time since noon,
$\frac{10}{10}$ " " $=\frac{10}{8}$ " "
$\frac{10}{8}+\frac{8}{8}=\frac{18}{8}=12$ hrs.; $\frac{1}{8}=\frac{12}{18}$, and $\frac{8}{8}=\frac{96}{18}$, or $5\frac{1}{3}$ hrs.
Ans. 5 o'clock, 20 min.

116. $121\times5.76=696.96$; $\sqrt{696.96}=26.4$. *Ans.*

117. Since $\frac{3}{4}$ of the time past midnight is equal to $\frac{2}{5}$ of the time to come, $\frac{1}{4}$ of the time past must be $\frac{1}{3}$ of $\frac{2}{5}$, or $\frac{2}{15}$, and $\frac{4}{4}$ must be equal to $\frac{2}{15}\times4$, or $\frac{8}{15}$. But $\frac{8}{15}+\frac{15}{15}=\frac{23}{15}$; therefore, 12 h. are equal to $\frac{23}{15}$ of the time to noon. Now, if $\frac{23}{15}=12$ h., $\frac{1}{15}$ is equal to $12\div23$, or $\frac{12}{23}$, and $\frac{15}{15}=\frac{12}{23}\times15=\frac{180}{23}$, or 7 h. $49\frac{13}{23}$ m. But 12 h.$-$(7 h $49\frac{13}{23}$ m.)$=$4 h. $10\frac{10}{23}$ m. Therefore, it is 4 o'clock, and $10\frac{10}{23}$ m. *Ans.*

Or thus, $\frac{15}{15}+\frac{8}{15}:\frac{8}{15}::12:$ to time past midnight.

118. $\frac{25}{36}\times\frac{81}{144}=\frac{2025}{5184}$; $\sqrt{\frac{2025}{5184}}=\frac{45}{72}$. *Ans.*

119. $6912\div3=2304$; $\sqrt{2304}=48$, No. in file;
and $48\times3=144$, No. in rank.

120. Since both together can reap an acre in 8 hours, in 1 h. they can reap $\frac{1}{8}$ of an acre. The man alone can reap $\frac{1}{11}$ A. in 1 h., therefore the boy reaps $\frac{1}{8}-\frac{1}{11}$ A. in 1 h. But $\frac{1}{8}-\frac{1}{11}=\frac{11}{88}-\frac{8}{88}=\frac{3}{88}$. Now, if $\frac{3}{88}$ A. requires the boy 1 h., $\frac{1}{88}$ will require $\frac{1}{3}$ h., $\frac{88}{88}$ A. will require $\frac{1}{3}$ h.$\times$ 88, or $29\frac{1}{3}$ hours. *Ans.*

121. Since 1 pipe will fill $\frac{1}{48}$ of the cistern in 1 m., and the other will discharge $\frac{1}{72}$ of it in 1 m., if both are running they will fill $\frac{1}{48}-\frac{1}{72}$ of it in 1 m. But $\frac{1}{48}=\frac{3}{144}$;

and $\frac{1}{12}$ m. $=\frac{12}{144}$; and $\frac{13}{144}-\frac{12}{144}=\frac{1}{144}$. Now, it to fill $\frac{1}{144}$ of the cistern requires 1 m., $\frac{144}{144}$ will require 1 m. × 144, or 144 min. *Ans.*

122. By the conditions, B has 1 (part or acre) as often as A has 2 (acres), and C 3 (acres). But $1+2+3=6$. Hence,

$1440\div6=240$ acres, B's share,
$240\times2=480$ " A's "
$240\times3=720$ " C's. "

Proof.—Sum of all $=1440$ acres.

123. If he had worked the whole time at 9s. per day, he would have received 9s. × 90 = 810s. But he received only £14, 2s., or 282s., consequently he lost 810s. − 282s. = 528s. By the conditions, for every day he was idle he forfeited 7s. 6d. besides his wages, and 9s. + 7½s. = 16½s. Now, if 16½s. loss require 1 day, 528s. loss will require as many days as 16½ is contained times in 528, and 528 ÷ 16½ = 32 d. But 90 d. − 32 d. = 58 d. He therefore worked 58 days. *Ans.*

124. The horses cost 1 part, and the carriage 3 times as much, or 3 parts. But $1+3=4$. Now, \$968 ÷ 4 = \$242, cost of horses; and \$242 × 3 = \$726, cost of carriage.

125. Since it cost \$1.50 to carpet $\frac{3}{4}$ of a sq. yd. it will cost \$2 to carpet a whole sq. yd. Now, 18 × 18 = 36 sq. yds. And \$2 × 36 = \$72. *Ans.*

126. It is plain C received $\frac{480}{1200}$ or $\frac{4}{10}$ of the gain. Now, if he received $\frac{4}{10}$ of the gain, he must have put in $\frac{4}{10}$ of the stock. Hence, A and B together put in $\frac{6}{10}$; consequently \$1200 $=\frac{6}{10}$ of the stock. Now, if $\frac{6}{10}=$ \$1200, $\frac{1}{10}=$ \$200, and $\frac{4}{10}=$ \$800, C's stock. Again, if \$800 stock gain \$480, \$100 stock will gain $\frac{1}{8}$ of \$480 = \$60.

Hence,
\$60 × 5 = \$300, A's gain,
\$60 × 7 = \$420, B's "
\$800, C's stock.

127. A receives \$6 as often as the sum of \$6 + \$10 + \$14, or \$30, is contained times in \$3600; and \$3600 ÷ \$30 = 120. Hence,

\$6 × 120 = \$720, A's share,
\$10 × 120 = \$1200, B's "
\$14 × 120 = \$1680, C's "

128. In 12 hours the minute hand gains eleven rounds, consequently it gains one round in $\frac{1}{11}$ of 12 hours, which is equal to 1 hr. $5\frac{5}{11}$ min. *Ans.*

129. $\frac{1}{3}+\frac{1}{4}=\frac{7}{12}$, part lost. $\frac{12}{12}-\frac{7}{12}=\frac{5}{12}$, part left.
Ans. 1200 sheep.

130. $\frac{1}{5}+\frac{1}{4}=\frac{9}{20}$; then $\frac{11}{20}=10$ ft., the part above water. Hence, $\frac{1}{20}=\frac{10}{11}$ ft., and $\frac{20}{20}=18\frac{2}{11}$ ft. *Ans.*

131. $(45)^2+(36)^2=3321$, and $\sqrt{3321}=57.628+$m. *Ans.*

132. Since the first traveled 8 miles an hour, it would take him 2 hours to go 16 m. But the second could go 19 m. as quick as the first could go 16 m.; therefore he traveled 19 m. in 2 hours, or $9\frac{1}{2}$ m. in 1 hour. Again, $9\frac{1}{2}$ m. $-$ 8 m. $=1\frac{1}{2}$ m.; consequently, the second gained on the first $1\frac{1}{2}$ m. per hour. Now, since the first had 51 miles the start, the second will be as many hours overtaking him, as $1\frac{1}{2}$ is contained times in 51, viz. hrs. And $34\times9\frac{1}{2}$ miles$=323$ miles.
Ans. 34 hours, and 323 miles.

THE END.

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